

PEMANFAATAN BATU ASAL PULAU BELAT DESA SEI ASAM DAN PASIR ASAL PULAU KARIMUN KABUPATEN KARIMUN SEBAGAI BAHAN UNTUK PEMBUATAN BETON NORMAL

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INTISARI

Banyaknya pembangunan infrastruktur di Kabupaten Karimun selama ini menggunakan agregat kasar batu granit dalam pembuatan beton normal, namun menimbulkan biaya yang cukup tinggi bagi pulau – pulau yang berjauhan akibat biaya pengangkutan material lewat laut. maka perlu adanya material alternatif pengganti granit, seperti kerikil alami asal Pulau Belat Desa Sei Asam. Agregat halus yang digunakan adalah pasir galian sisa penambangan batu granit PT. Pasific Granitama asal Pulau Karimun. Namun untuk memanfaatkan bahan-bahan tersebut perlu dilakukan penelitian terlebih dahulu, maka dilakukan penelitian ini. Material penyusun beton seperti pasir dan batu termasuk mudah dijumpai di kabupaten Karimun dan belum digunakan secara optimal. Untuk mendapatkan beton yang berkualitas maka pasir dan kerikil yang digunakan perlu dilakukan pengujian untuk mengetahui sifat fisik serta sifat beton normal yang dihasilkan.

Pada penelitian ini bahan-bahan yang digunakan adalah kerikil alami asal Pulau Belat Desa Sei Asam dan pasir galian sisa penambangan batu granit PT. Pasific Granitama asal Pulau Karimun, semen Portland komposit merk Holcim dan air dari laboratorium bahan bangunan UGM. Rancangan adukan beton berdasarkan SNI 03-2834-1993 dan variasi fas 0,4; 0,5; 0,6 dengan nilai *slump* 6±2 cm dan 10±2 cm pada masing-masing variasi. Proporsi agregat campuran dengan perbandingan 45% pasir galian dan 55% kerikil alami. Jumlah adukan dibuat sebanyak 6 adukan; tiap adukan terdiri dari 9 benda uji (total 54 buah silinder) dengan ukuran silinder d=150 mm dan t=300 mm untuk pengujian kuat tekan beton, 3 buah kubus (total 18 buah kubus) dengan ukuran 150x150x150 mm yang digunakan untuk uji serapan air dan 3 buah balok (total 18 buah balok) dengan ukuran 100x100x500 mm untuk uji kuat lentur.

Pasir galian hasil penelitian memiliki berat jenis SSD 2,467, berat satuan 1,307 gr/cm³, daya serap air 3,15% (SSD), kandungan lumpur 2,86%, mhb 3,32. Untuk kerikil alami memiliki berat jenis SSD 2,939, berat satuan 1,586 gr/cm³, daya serap air 5,217%, kandungan lumpur 0,58%, hasil uji keausan 39,65%, hasil uji kekerasan 17,303%, mhb 7,89. Beton fas 0,4 dengan kandungan semen berturut-turut 404,36 kg/m³ dan 442,58 kg/m³ diperoleh kuat tekan 30,598 MPa dan 30,919 MPa. Fas 0,5 dengan kandungan semen berturut-turut 322,28 kg/m³ dan 353,39 kg/m³ diperoleh kuat tekan 28,774 MPa dan 26,224 MPa. Fas 0,6 dengan kandungan semen berturut-turut 267,71 kg/m³ dan 293,94 kg/m³ diperoleh kuat tekan 20,822 MPa dan 20,483 MPa. Modulus elastisitas beton $E = 5220,2\sqrt{f'_c}$. Laju kenaikan kuat tekan beton umur 3,7 dan 28 hari adalah 55%, 87% dan 100%. Nilai serapan air rata-rata untuk waktu perendaman 10 menit dan 24 jam berturut-turut antara 0,536% - 1,529% dan antara 1,323% - 3,633%. Secara umum disimpulkan pasir dan kerikil hasil penelitian layak dijadikan sebagai bahan beton normal dan merupakan beton kedap air normal.

Kata kunci : kerikil alami asal Pulau Belat, pasir asal Pulau Karimun, kering jenuh permukaan

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(SSD), kuat tekan, beton normal

THE UTILIZATION OF BELAT ISLAND-ORIGINATED GRAVELS OF SEI ASAM VILLAGE AND KARIMUN ISLAND-ORIGINATED AGGREGATES OF KARIMUN DISTRICT AS MATERIALS IN NORMAL CONCRETE PRODUCTION

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ABSTRACT

Recently the infrastructure development in Karimun District use granite coarse aggregate to produce normal concretes. However, it demands more expenses for remote islands due to costly transportation. Hence, it is necessary to find the substitute materials for granites, such as natural gravels from the Belat Island of Sei Asam village. The fine aggregates are the residual aggregates excavated from the granite mining operation of Karimun Island-based PT. Granitama Pacific. However, to utilize these materials, research should be firstly conducted; therefore, this research was conducted. The concrete materials such as aggregates and stones were easily found in Karimun District, and less optimal exploitation has been carried out yet. To produce good quality concretes, the aggregates and gravels used should be firstly tested to identify the physical properties and the normal properties of concrete produced.

In this research, the materials used involved natural gravels from the Belat Island of Sei Asam village, and the residual aggregates of Karimun Island –based PT. Granitama Pacific granite mining, Holcim Portland composite cement and water from the UGM building material laboratory. The design of concrete mixture was based on the SNI 03-2834-1993 and w/c variation 0.4, 0.5, 0.6 with the slump value of 6 ± 2 cm and 10 ± 2 cm in each variation. The proportion of aggregate mixture was based on the ratio of 45% and 55% for the excavated aggregates and natural gravels.

The excavated aggregates showed the SSD density of 2.467, unit weight of 1.307 gr/cm^3 , water absorption of 3.15% (SSD), mud content of 2.86%, fineness modulus 3.32. The natural gravels showed the SSD density of 2.939, unit weight of 1.586 gr/cm^3 , water absorption of 5.217%, mud content of 0.58%, wear test result of 39.65%, hardness test result of 17.303%, fineness modulus 7.89. The w/c 0.4 with cement contents of 404.36 kg/m^3 and 442.58 kg/m^3 produced compressive strength of 30.598 MPa and 30.919 MPa, respectively, The w/c 0.5 with cement contents of 322.28 kg/m^3 and 353.39 kg/m^3 produced the compressive strength of 28.774 MPa and 26.224 MPa, respectively. The w/c 0.6 with cement contents of 267.71 kg/m^3 and 293.94 kg/m^3 produced the compressive strength of 20.822 MPa and 20.483 MPa, respectively. The elasticity modulus of concrete $E = 5220,2 \sqrt{f'_c}$. The increasing rate of concrete compressive strength were 3,7 and 28 days were 55%, 87%, and 100%. The average water absorption of soaking time were 10 minutes and 24 consecutive hours ranged 0.536% - 1.529% and 1.323% - 3.633%. In general, the aggregates and gravels investigated in the research were feasible to be utilized as the materials in normal concrete production, and the concrete materials produced was normal water resistant.

Key words: Belat Island-originated gravels, Karimun Island-originated aggregates, saturated surface dry (SSD), compressive strength, normal concrete