# CHAPTER V
# CONCLUSION AND ADVICE

## 5.1 Conclusion

Based on the results of the research and discussion that has been carried out, it can be concluded:

1) Slump Test

The slump test results show that the replacement of coral reefs as coarse aggregate in concrete makes the slump value increase, this is because coral aggregates have a shape that tends to be round compared to crushed gravel which has an angular shape, which the use of spherical coarse aggregates produces concrete that is easier to work with. Also the coral aggregates were stored outdoors due to limited storage space, while the crushed gravel was stored indoors, which the increased moisture content of the coral aggregate increases the amount of water in the concrete. The more water used, the easier the concrete is to work with. The average slump value of 0%, 25%, 50%, 60% and 75% coral reef variation concrete are 9.75 cm, 10 cm, 11 cm, 11.75 cm and 13.5 cm, in this study the slump value meets the standard slump value for floor or wall slabs which is around 7.5 - 15 cm.

2) Unit Weight

From the results of the concrete unit weight test, it can be concluded that the increasing of coral reefs as a substitute for coarse aggregate in concrete decreases the value of its content weight. The decrease in the unit weight of concrete with increasing composition of coral aggregate is due to the fact that coral aggregate has a lighter relative density and volume weight compared to the relative density of crushed gravel. Based on SNI 03-2847-2002 where the weight of normal concrete contents ranges from 2200 Kg/m3 to 2500 Kg/m3. The weight of fresh concrete contents, the average unit weight is qualified from 0%, 25%, 50%, and 60% mixes.

3) Water Absorption

From the results of the concrete water absorption test, it can be seen that the addition of coral aggregate makes the absorption value increase. High porosity aggregate affects the absorption value of concrete because it covers 61% of the weight of concrete, thus making concrete have a high absorption value. The average absorption value of the mixture of 0%, 25%, 50%, 60%, and 75% sequentially is 4.381%, 5.399%, 5.474%, 9.290%, and 12.067%. from this value the absorption of the mixture 0% to 50% meets the

requirements of SNI 03-2914-1992, where the maximum value for test objects soaked 1 x 24 hours is 6.5%.

4) Compressive Strength

The average compressive strength of 0% coral reefs is 12.371 MPa, at the age of 28 days, with the compressive strength value of each test specimen 1, 2, 3 sequentially equal to 11.899 MPa, 12.466 MPa, and 12.749 MPa. From these values it can be concluded that normal concrete without a mixture of coral reef meets the requirements. While concrete with the replacement of coral reefs as aggregate composition of 25%, 50%, 60%, and 75% does not meet the requirements and experienced a decrease in compressive strength with a sequential average compressive strength value of 10.355 MPa, 10.077 MPa, 9.523 MPa, and 8.413 MPa. From these compressive strength values, the 25% and 50% concrete variations meet the requirements of non-structural concrete used as a working floor and concrete backfill material 10 MPa ≤ f'c. From the results of the study, it was concluded that the replacement of gravel using coral reefs made the concrete experience a decrease in concrete compressive strength. The characteristics of coral aggregate that make the quality of concrete decrease are: Coral aggregate has a smaller relative density than crushed gravel, and a higher absorption value than crushed gravel, coral aggregate affects the water absorption value of concrete because coral aggregate has a high porosity and absorption value, the shape of coral aggregates tends to be more rounded than that of angular crushed and there is also mud content in the coral aggregate.

## 5.2 Advice

Suggestions from researchers to get better concrete, it is necessary to pay attention to the following points:

1 It is necessary to pay attention to the preparation or placement of materials to be used, to be protected from sunlight, rainwater and extreme temperatures.

2 Concrete pouring must be done properly, making sure that the concrete is solid in order that there are no voids in the concrete in the mold. This can increase the compressive strength of the concrete and reduce the absorption of the concrete.

3 The coral reef needs to be cleaned first in order that is free of fine material.

4 It is necessary to conduct concrete research with coral reef coarse aggregate in concrete using additives such as plasticizers.

# BIBLIOGRAPHY


American society for testing and materials. (2003). ASTM C 33: Standard Specification for Concrete Aggregates. *ASTM Standard Book*.

Bangki, J. (2020). Perbandingan Gradasi Seragam Dan Gradasi Menerus Terhadap Kuat Tekan Beton. *Jurnal Media Inovasi Teknik Sipil UNIDAYAN*, *9*(1), 62–71. https://doi.org/10.55340/jmi.v9i1.654

Wikipedia.org. (n.d). *Coral Reef* Retrieved May 17, 2024, from https://en.wikipedia.org/wiki/Coral_reef

Education National Geographic.org. (n.d.). *Reef*. Retrieved May 17, 2024, from https://education.nationalgeographic.org/resource/reef/

Fauzan, & Suciati, H. (2022). *Efek penggunaan limbah terumbu karang pada komposit beton*. *5*(1), 119–127.

Institute, A. C. (2007). *Aggregates for Concrete, ACI Education Bulletin E1-07*.

Joni, G. P. (2011). *FAKTOR YANG MEMPENGARUHI MUTU BETON*. *L*, 1–9.

Kementrian PUPR. (2019). *Pelatihan Spesifikasi Umum Untuk Pekerjaan Konstruksi Bidang Jalan Dan Jembatan*. Kementerian Pekerjaan Umum dan Perumahan Rakyat.

Kurniawan, A., Afrizal, Y., & Gunawan, A. (2016). *Pengaruh Pemanfaatan Pecahan Terumbu Karang Sebagai Pengganti Agregat Halus Terhadap Kuat Tekan Beton*. *8*(2).

Laboratorium Teknik Sipil UNTAG. (2022). *Buku Petunjuk Praktikum Beton*. Universitas 17 Agustus 1945.

Li, Z., Zhou, X., Ma, H., & Hou, D. (2022). *Advanced Concrete Technology* (2nd ed.). Wiley.

liputan6.com. (n.d.). *Kampung Lobuk Punya 2 Desa, 2 Kecamatan, 2 Kabupaten - Regional Liputan6.com*. Retrieved April 22, 2022, from https://www.liputan6.com/regional/read/3057506/kampung-lobuk-punya-2-desa-2-kecamatan-2-kabupaten

Live Science. (n.d.). *What Are Coral Reefs?* Retrieved May 17, 2024, from https://www.livescience.com/40276-coral-reefs.html

Mulyono, T. (2003). *Teknologi Beton* (2nd ed.). C.V ANDI OFFSET.

Mulyono, T. (2015). *Teknologi Beton : Dari Teori ke Praktek*. Lembaga Pengembangan Pendidikan - UNJ. http://www.unj.ac.id

Nugraha, P., & Antoni. (2007). *TEKNOLOGI BETON dari material, Pembuatan, ke Beton Kinerja Tinggi* (F. S. Suryanto (Ed.); 1st ed.). C.V ANDI OFFSET.

Pangaribuan, M. R., & Narlis. (2015). Penggunaan Batu Karang , Tanah Sebagai Pengganti Agregat Dalam Pembuatan Beton K-175. *Prosiding PESAT (Psikologi, Ekonomi, Sastra, Arsitektur &Teknik Sipil)*, *6*, T33–T47.

Putra, H. R., & Sefrus, T. (2022). *Studi Karang Mati Sebagai Pengganti Agregat Kasar Pada Adukan Beton*. *xx*(x).

Rochmah, N. (2016). Pemanfaatan Batu Kapur Didaerah Sampang Madura Sebagai

Bahan Pengganti Agregat Kasar Pada Campuran Beton. *JHP17 Jurnal Hasil Penelitian LPPM Untag Surabaya*, *01*(02), 217–226.

Rondonuwu, F., Rumayar, A. L. E., & Manoppo, M. R. E. (2013). Pengaruh Sifat Fisik Agregat terhadap Rongga dalam Campuran Beraspal Panas. *Jurnal Sipil Statik*, *1*(3), 184–189.

Scribd.com. (n.d.). *Agregat Kasar*. Retrieved June 20, 2024, from https://www.scribd.com/doc/312546776/Agregat-Kasar

Shandy, S., & Hermanto, J. (2019). Studi Korelasi Porositas Beton Terhadap Kuat Tekan Beton Rata-Rata Menggunakan Agregat Kasar Batu Angus. *Dintek*, *12*(1), 72–83.

Silalahi, L. M. (2021). *Pengaruh Penggunaan Abu Genteng Sebagai Bahan Tambah Terhadap Kuat Tekan Beton Alir*.

Sina, Tresna, D. A., & Hendra. (2003). *Potensi penggunaan batu karang pulau Timor sebagai agregat kasar pada beton - Scientific Repository*. https://repository.petra.ac.id/1505/

SNI-1972-2008. (2008). *Cara Uji Slump Beton*. Badan Standar Nasional Indonesia.

SNI 03-1971-1990. (1990). SNI 03-1971-1990 Tentang Metode Pengujian Kadar Air Agregat. In *Badan Standarisasi Nasional*.

SNI 03-2834-2000. (2000). *Tata cara pembuatan rencana campuran beton normal*. Badan Standar Nasional Indonesia.

SNI 03-2847-2002. (2002). *Tata Cara Perhitungan Struktur Beton Untuk Bangunan Gedung*. Badan Standar Nasional Indonesia.

SNI 03-2914-1992. (1992). *Spesifikasi Beton Bertulang Kedap Air*. Badan Standar Nasional Indonesia.

SNI 03-6433-2000. (2000). *Metode Pengujian Kerapatan, Penyerapan dan Rongga Dalam Beton yang Telah Mengeras*. Badan Standar Nasional Indonesia.

SNI 1970-2008. (2008). *Cara uji berat jenis dan penyerapan air agregat halus*. Badan Standar Nasional Indonesia.

SNI 1973-2008. (2008). *Cara uji berat isi, volume produksi campuran dan kadar udara beton*. Badan Standar Nasional Indonesia.

SNI 1974:2011. (n.d.). *Cara uji tekan kuat beton dengan benda uji silinder*. Badan Standar Nasional Indonesia.

SNI 2847-2013. (2013). *Persyaratan beton struktural untuk bangunan gedung*. Badan Standar Nasional Indonesia.

Sulistyawati, R. (2009). Pengaruh Penggunaan Zat Additive BestmittelTerhadap Kuat Tekan Beton. *Teodolita*, *11*(2), 34–46.

Sultan, M. A., Imran, & Litiloly, F. (2018). Korelasi Porositas Beton Terhadap Kuat Tekan Rata-Rata. *Jurnal Teknologi Sipil*, *2*(2), 57–63.

Tjokrodimuljo, K. (1996). *Teknologi Beton* (Nafiri (Ed.)).

Tomayahu, Y. (2016). Analisa Agregat terhadap Kuat Tekan Beton pada Pembangunan Jalan Isimu-paguyaman Metode Paving Rigid. *RADIAL :Jurnal Peradaban Sains, Rekayasa Dan Teknologi*, *4*(2), 128–138. https://stitek-

inataruna.e-journal.id/radial/article/view/132

Wang, F., Sun, Y., Xue, X., Wang, N., & Zhou, J. (2023). Case Studies in Construction Materials Mechanical properties of modified coral aggregate seawater sea-sand concrete : Experimental study and constitutive model. *Case Studies in Construction Materials*, *18*(April), e02095. https://doi.org/10.1016/j.cscm.2023.e02095

Wesli, W., Fuadi, A., & Chandra, Y. (2023). Kuat Tekan Beton Ringan Non-Pasir Pada Pemanfaatan Batu Karang Simeulue Sebagai Alternatif Agregat Kasar. *Teras Jurnal : Jurnal Teknik Sipil*, *13*(2), 443. https://doi.org/10.29103/tj.v13i2.979

Widyawati, R. (2011). Serapan, Penetrasi Dan Permeabilitas Beton Ringan. *Seminar Nasional Sain Dan Teknologi - Iv*, *November*, 895–912.

Witjaksana, B. (2016). Penambahan Fibre Steel pada Campuran Beton. *Jurnal Hasil Penelitian LPPM Untag Surabaya*, *01*(02), 209–216.

Yamin, H. R. A. (2011). *Pemanfaatan Batu Karang Kristalin Fak Fak Untuk Campuran Beraspal*.

**"This page is intentionally left blank"**