

DAFTAR PUSTAKA

- A.M. Mustafa Al Bakri, Kamarudin, H., Bnhussain, M., Nizar, I. K., & Mastura, W. I. W. (2013). Mechanism and Chemical Reaction of Fly Ash Geopolymer Cement- A Review. *Journal of Chemical Information and Modeling*, 53(5), 1689–1699.
- Abdeldjouad, L., Asadi, A., Nahazanan, H., Huat, B. B. K., Dheyab, W., & Elkhebu, A. G. (2019). Effect of Clay Content on Soil Stabilization with Alkaline Activation. *International Journal of Geosynthetics and Ground Engineering*, 5(1), 1–8. <https://doi.org/10.1007/s40891-019-0157-y>
- Abdullah, H. H., Shahin, M. A., & Walske, M. L. (2020). Review of fly-ash-based geopolymers for soil stabilisation with special reference to clay. *Geosciences (Switzerland)*, 10(7), 1–17. <https://doi.org/10.3390/geosciences10070249>
- Abo Sabah, S. H., Zainul, Z., Hashim, S. F. S., & Megat Johari, M. A. (2020). The influence of palm oil fuel ash on the fresh properties of green self-compacting concrete. *IOP Conference Series: Materials Science and Engineering*, 849(1), 1989–1999. <https://doi.org/10.1088/1757-899X/849/1/012066>
- Adebayo Mujedu, K., Ab-Kadir, M. A., & Ismail, M. (2020). A review on self-compacting concrete incorporating palm oil fuel ash as a cement replacement. *Construction and Building Materials*, 258, 119541. <https://doi.org/10.1016/j.conbuildmat.2020.119541>
- Ahmed, B., Abdul Alim, M., & Abu Sayeed, M. (2013). Improvement of Soil Strength Using Cement and Lime Admixtures. *Earth Science*, 2(6), 139–144. <https://doi.org/10.11648/j.earth.20130206.14>
- Al-Khafaji, Z., & Al-Najar, A. (2018). A review applying industrial waste materials in stabilisation of soft soil. *Electronic Journal of Structural Engineering*, 18(2), 16–23. <https://doi.org/https://doi.org/10.56748/ejse.182602>
- Albajili, F., Fatnanta, F., & Agus Nugroho, S. (2014). Korelasi Antara Nilai Cbr Dan Nilai Kuat Geser Sebagai Tanah Timbun. *Jom FTEKNIK*, 1(2), 1–10.
- Alsubari, B., Shafiqh, P., Ibrahim, Z., Alnahhal, M. F., & Jumaat, M. Z. (2018). Properties of eco-friendly self-compacting concrete containing modified treated palm oil fuel ash. *Construction and Building Materials*, 158, 742–754. <https://doi.org/10.1016/J.CONBUILDMAT.2017.09.174>
- Alsubari, B., Shafiqh, P., Ibrahim, Z., & Jumaat, M. Z. (2018). Heat-treated palm oil fuel ash as an effective supplementary cementitious material originating from agriculture waste. *Construction and Building Materials*, 167, 44–54. <https://doi.org/10.1016/j.conbuildmat.2018.01.134>
- Alsubari, B., Shafiqh, P., & Jumaat, M. Z. (2015). Development of self-consolidating high strength concrete incorporating treated palm oil fuel ash. *Materials*, 8(5), 2154–2173. <https://doi.org/10.3390/ma8052154>
- An, C., & Fatnanta, F. (2015). Stabilization of Clay Soil Using Palm Oil Fuel Ash (POFA). *Jom Engineering Faculty*, 2(1), 1–13.

- Andriani, Putra, H. G., Yuliet, R., Maulana, R., & Marel, S. P. (2023). Analysis of clay improvement as subgrade using Palm Oil Fuel Ash (Pofa). *IOP Conference Series: Earth and Environmental Science*, 1173(1). <https://doi.org/10.1088/1755-1315/1173/1/012024>
- Ariffin, M. A. M., Hussin, M. W., & Bhutta, M. A. R. (2011). Mix design and compressive strength of geopolymers concrete containing blended ash from agro-industrial wastes. *Advanced Materials Research*, 339(1), 452–457. <https://doi.org/10.4028/www.scientific.net/AMR.339.452>
- Association, G. C. and C. (2024). *Alkali-activated materials*. Global Cement and Concrete Association.
- ASTM. (2010). Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use. *Annual Book of ASTM Standards*, C, 3–6. <https://doi.org/10.1520/C0618-19.2>
- Aulia, R., Yulvi, Z., & Eko Andi, S. (2014). Perbandingan Modulus Reaksi Subgrade Berdasarkan Uji Cbr Terhadap Hasil Uji Beban Pelat (Studi Kasus: Perencanaan Perkerasan Kaku). *Jurnal Mahasiswa Jurusan Teknik Sipil*, 1(1).
- Awal, A. S. M. A., & Mohammadhosseini, H. (2016). Green concrete production incorporating waste carpet fiber and palm oil fuel ash. *Journal of Cleaner Production*, 137, 157–166. <https://doi.org/10.1016/j.jclepro.2016.06.162>
- Bahmani, S. H., & Orense, R. P. (2017). *Review on recent developments in alkali-activated materials*. 1–8.
- Bashar, I. I., Alengaram, U. J., Jumaat, M. Z., & Islam, A. (2014). The effect of variation of molarity of alkali activator and fine aggregate content on the compressive strength of the fly ash: Palm oil fuel ash based geopolymers mortar. *Advances in Materials Science and Engineering*. <https://doi.org/10.1155/2014/245473>
- Bernal, S., Mejia, R., & Rodríguez, E. (2013). Alkali-activated materials: cementing a sustainable future. *Revista de La Facultad de Ingeniería*, 15, 211–233.
- Borno, I. B., Haque, M. I., & Ashraf, W. (2023). Crystallization of C-S-H and C-A-S-H in artificial seawater at ambient temperature. *Cement and Concrete Research*, 173, 107292. <https://doi.org/https://doi.org/10.1016/j.cemconres.2023.107292>
- Bowles, J. E. (1997). Analisis dan Desain Pondasi Jilid 1. Erlangga, Jakarta, 1.
- Brinkgreve, R. B.. (2007). *Manual Acuan PLAXIS Versi 8*.
- Chen, R., Zhu, Y., Lai, H. peng, & Bao, W. (2020). Stabilization of soft soil using low-carbon alkali-activated binder. *Environmental Earth Sciences*, 79(22), 1–13. <https://doi.org/10.1007/s12665-020-09259-x>
- Christandy, Y., & Pranantya, N. D. (2017). Kajian Nilai Modulus Reaksi Subgrade Dan Nilai Cbr Berdasarkan Pengujian Di Laboratorium. *G - Smart*, 1(1), 43. <https://doi.org/10.24167/gs.v1i1.924>
- Consoli, N. C., Schnaid, F., & Milititsky, J. (1998). INTERPRETATION OF PLATE LOAD TESTS ON RESIDUAL SOIL SITE. *Journal of Geotechnical*

- and Geoenvironmental Engineering*, 124(September), 857–867.
- Cristelo, N., Fernández-Jiménez, A., Vieira, C., Miranda, T., & Palomo, Á. (2018). Stabilisation of construction and demolition waste with a high fines content using alkali activated fly ash. *Construction and Building Materials*, 170, 26–39. <https://doi.org/https://doi.org/10.1016/j.conbuildmat.2018.03.057>
- Cristelo, N., Glendinning, S., Fernandes, L., & Teixeira, A. (2012). Effect of calcium content on soil stabilisation with alkaline activation. *Construction and Building Materials*, 29, 167–174. <https://doi.org/10.1016/j.conbuildmat.2011.10.049>
- Cristelo, N., Glendinning, S., & Pinto, A. T. (2011). Deep soft soil improvement by alkaline activation. *Proceedings of the Institution of Civil Engineers: Ground Improvement*, 164(2), 73–82. <https://doi.org/10.1680/grim.900032>
- Cristelo, N., Miranda, T., Oliveira, D. V., Rosa, I., Soares, E., Coelho, P., & Fernandes, L. (2015). Assessing the production of jet mix columns using alkali activated waste based on mechanical and financial performance and CO₂ (eq) emissions. *Journal of Cleaner Production*, 102, 447–460. <https://doi.org/https://doi.org/10.1016/j.jclepro.2015.04.102>
- Das, B. M. (1995a). Mekanika Tanah (Prinsip-prinsip Rekayasa Geoteknik). *Mekanika Tanah, Prinsip-Prinsip Rekayasa Geoteknis Jilid 1*, 300.
- Das, B. M. (1995b). Mekanika Tanah (Prinsip-prinsip Rekayasa Geoteknis). *Mekanika Tanah, Prinsip-Prinsip Rekayasa Geoteknis Jilid 2*.
- Das, B. M. (2019). *Advanced Soil Mechanic* (4th ed.). CRC Press Taylor & Francis Group. <http://taylorandfrancis.com>
- Davidovits, J. (1991). Geopolymers. *Journal of Thermal Analysis*, 37(8), 1633–1656. <https://doi.org/10.1007/bf01912193>
- Davidovits, Joseph, & Resins, G. (1980). Geopolymer chemistry and sustainable development . The Poly (silicate) term inology : a very useful and simple model for the promotion and understanding of green-chemistry . *Geopolymer 2005 Conference, July 2005*, 9–16.
- Demirboga, R., & Farhan, K. Z. (2022). Palm oil fuel ash (POFA). *Sustainable Concrete Made with Ashes and Dust from Different Sources: Materials, Properties and Applications*, 279–330. <https://doi.org/10.1016/B978-0-12-824050-2.00006-1>
- DHANI, N. (2020). Experimental Study On Bearing Capacity Of Soft Soil Using Overboulder Asbuton Stabilization as Sub-Base Course. *Desertasi*.
- Dheyab, W., Ismael, Z. T., Hussein, M. A., & Huat, B. B. K. (2019). Soil stabilization with geopolymers for low cost and environmentally friendly construction. *International Journal of GEOMATE*, 17(63), 271–280. <https://doi.org/10.21660/2019.63.8159>
- Direktorat Jenderal Bina Marga. (2020). Spesifikasi Umum Bina Marga 2018 Untuk Pekerjaan Konstruksi Jalan dan Jembatan (Revisi 2). *Kementerian Pekerjaan Umum Dan Perumahan Rakyat, Oktober*, 1036.

- Direktur Jenderal Bina Marga. (2017). *Manual Desain Perkerasan Jalan Revisi 2017* (Edisi Ke 2, Issue 02). Kementerian Pekerjaan Umum & Perumahan Rakyat - Direktorat Jenderal Bina Marga.
- Dirgantoro, M. ., & Adawiyah, R. (2018). Economic Value the Utilize of Palm Oil Waste Toward Zero Waste Production. *Jurnal Biowallacea*, 5(2), 852–837.
- Doležal, J., Škvára, F., Svoboda, P., Šulc, R., Kopecký, L., Pavlasová, S., Myšková, L., Lucuk, M., & Dvořák, K. (2017). CONCRETE BASED ON FLY ASH GEOPOLYMERS.
- Dolli, C., & Romdhon, M. M. (2018). Economic Value of The Utilization of Oil Palm Waste In Bengkulu Utara District , Bengkulu Province. *Jurnal Agripita*, 2(2), 103–109.
- Dony, W., Saloma, & Astira, I. F. (2018). Oil palm ash-based geopolymer mortar with variation $\text{Na}_2\text{SiO}_3/\text{NaOH}$ ratio. *AIP Conference Proceedings*, 2030, 1–8. <https://doi.org/10.1063/1.5066745>
- Duxson, P., Fernández-Jiménez, A., Provis, J. L., Lukey, G. C., Palomo, A., & Van Deventer, J. S. J. (2007). Geopolymer technology: The current state of the art. *Journal of Materials Science*, 42(9), 2917–2933. <https://doi.org/10.1007/s10853-006-0637-z>
- Eka Putri, E., V Kameswara Rao, N. S., & Mannan, M. A. (2012). Evaluation of Modulus of Elasticity and Modulus of Subgrade Reaction of Soils Using CBR Test. *Journal of Civil Engineering Research*, 2(1), 34–40. <https://doi.org/10.5923/j.jce.20120201.05>
- Elbasir, O., Johari, M. A. M., & Ahmad, Z. A. (2019). Effect of fineness of palm oil fuel ash on compressive strength and microstructure of alkaline activated mortar. *European Journal of Environmental and Civil Engineering*, 23(2), 136–152. <https://doi.org/10.1080/19648189.2016.1271362>
- Fauziah, M. (2013). Utilize of the shell palm oil waste as add material to increase the strength and durability of Asphalt Concrete Binder Course (AC-BC). In W. Brontowiyono, S. Winarno, & J. Sriyana (Eds.), *Proceeding National Seminar 2013 To Madani and Sustainable Society* (pp. 377–384). Universitas Islam Indonesia.
- Felaous, K., Aziz, A., Achab, M., Fernández-Raga, M., & Benzaouak, A. (2023). Optimizing Alkaline Activation of Natural Volcanic Pozzolan for Eco-Friendly Materials Production: An Investigation of NaOH Molarity and Na_2SiO_3 -to- NaOH Ratio. *Sustainability* (Switzerland), 15(5). <https://doi.org/10.3390/su15054453>
- Firincioglu, B. S. (2018). Applied Sciences. *Early Writings on India*, 124–134. <https://doi.org/10.4324/9781315232140-14>
- Fitramsyah, S., & Pujiastutie, E. T. (2022). Pengaruh Penambahan Abu Tandan Kelapa Sawit Terhadap Daya Dukung Tanah Lempung. 16(1).
- Fu Hua Chen. (1979). *Foundations On Expansive Soils* (2nd ed.). Elsevier Scientific Publishing Company. [https://doi.org/10.1016/s0376-7361\(08\)70127-4](https://doi.org/10.1016/s0376-7361(08)70127-4)
- Galau, D., & Ismail, M. (2010). *Characterization of Palm Oil Fuel Ash (POFA)*

-) from Different Mill as Cement Replacement Material Characterization of Palm Oil Fuel Ash (POFA) from Different Mill as. April 2015, 1–9.
- Garcia-Lodeiro, I., Palomo, A., & Fernández-Jiménez, A. (2015a). An overview of the chemistry of alkali-activated cement-based binders. In *Handbook of Alkali-Activated Cements, Mortars and Concretes*. Woodhead Publishing Limited. <https://doi.org/10.1533/9781782422884.1.19>
- Garcia-Lodeiro, I., Palomo, A., & Fernández-Jiménez, A. (2015b). Crucial insights on the mix design of alkali-activated cement-based binders. In *Handbook of Alkali-Activated Cements, Mortars and Concretes*. Woodhead Publishing Limited. <https://doi.org/10.1533/9781782422884.1.49>
- Geopolymer Institute. (2017). Why Alkali-Activated Materials are NOT Geopolymers ? – Geopolymer Institute. *Geopolymer Camp, November*. <https://doi.org/10.13140/RG.2.2.34337.25441>
- Habert, G. (2013). Environmental impact of Portland cement production. *Eco-Efficient Concrete*, 3–25. <https://doi.org/10.1533/9780857098993.1.3>
- Hafizh, M. S. Al, Wibisono, G., & Nugroho, S. A. (2017). Stabilisasi Tanah Lempung Dengan Pasir Bermacam Gradasi Dan Campuran Kapur. *Jom FTEKNIK*, 4(2), 1–9. <https://jom.unri.ac.id/index.php/JOMFTEKNIK/article/view/16717>
- Hakam, A, Yuliet, R., & Donal, R. (2010). Studi Pengaruh Penambahan Tanah Lempung Pada Tanah Pasir Pantai Terhadap Kekuatan Geser Tanah. *Rekayasa Sipil*, 6(1), 11–22. <https://doi.org/10.31869/rtj.v3i2.1840>
- Hakam, Abdul. (2008). *Foundation Engineering* (S. Heka Putri Andriani (ed.)). Bintang Grafika.
- Hamada, H. M., Yahaya, F., Muthusamy, K., & Humada, A. (2019). Comparison study between POFA and POCP in terms of chemical composition and physical properties-Review paper. *IOP Conference Series: Earth and Environmental Science*, 365(1). <https://doi.org/10.1088/1755-1315/365/1/012004>
- Hamada, Hussein M., Jokhio, G. A., Yahaya, F. M., Humada, A. M., & Gul, Y. (2018). The present state of the use of palm oil fuel ash (POFA) in concrete. *Construction and Building Materials*, 175, 26–40. <https://doi.org/10.1016/j.conbuildmat.2018.03.227>
- Handayasari, I. (2016). Stabilisasi Tanah Menggunakan Kaolin Dan Kapur (Studi Kasus Tanah Residual Di Area Stt-Pln Duri Kosambi Jakarta Barat). *Jurnal Forum Mekanika*, 5(2), 91–96.
- Hangge, E. E., Bella, R. A., & Ullu, M. C. (2021). Pemanfaatan Fly Ash Untuk Stabilisasi Tanah Dasar Lempung Ekspansif. *Jurnal Teknik Sipil*, 10(1), 89–102.
- Hardiyatmo, H. C. (2012). *Mekanika Tanah 1* (Ke enam). Gadjah Mada University Press, Yogyakarta.
- Hardiyatmo, H. C. (2017). *Stabilisasi Tanah Untuk Perkerasan Jalan* (3rd ed.). Gadjah Mada University Press, Yogyakarta.

- Hardiyatmo, H. C. (2018). *Mekanika Tanah 2* (Ke enam). Gadjah Mada University Press, Yogyakarta.
- Harianto, T., Marfu'ah, N., Rauf, I., & Leatemia, T. B. C. (2020). Experimental Study of Natural Materials Utilization as a Stabilization Agent on Soft Soil. *IOP Conference Series: Materials Science and Engineering*, 875(1). <https://doi.org/10.1088/1757-899X/875/1/012029>
- Haryanti, A., Norsamsi, N., Fanny Sholiha, P. S., & Putri, N. P. (2014). Studi Pemanfaatan Limbah Padat Kelapa Sawit. *Konversi*, 3(2), 20. <https://doi.org/10.20527/k.v3i2.161>
- Hashim, A. N., Hussin, K., Begum, N., Al Bakri Abdullah, M. M., Abdul Razak, K., & Ekaputri, J. J. (2015). Effect of Sodium Hydroxide (NaOH) Concentration on Compressive Strength of Alkali-Activated Slag (AAS) Mortars. *Applied Mechanics and Materials*, 754–755, 300–304. <https://doi.org/10.4028/www.scientific.net/amm.754-755.300>
- Herman, W., & Fiska. (2020). Studi Pengaruh Penambahan Tanah Lempung Terhadap Daya Dukung Pasir Pantai. 3(2), 279–286. <https://doi.org/http://dx.doi.org/10.31869/rtj.v3i2.1840>
- Hicks, R. G. (2002). Alaska Soil Stabilization Design Guide. *State of Alaska Department of Transportation and Public Facilities Research & Technology Transfer Fairbanks, AK 99709-5399*, 1–64.
- Humaedi, M. D. C., Saloma, Hanafiah, Iqbal, & M., M. (2021). Compressive Strength and Microstructural of Palm Oil Fuel Ash-Fly Ash Based Geopolymer Mortar. *Journal of Physics: Conference Series*, 1783(1). <https://doi.org/10.1088/1742-6596/1783/1/012081>
- Ika Ernawati, W. D. , A. M. ,. (2015). Optimasi Kadar Aspal pada Stabilisasi Tanah Pasir Menggunakan Aspal dengan Uji CBR. *Semesta Teknika*, 14(2), 127–132. <https://doi.org/10.18196/st.v14i2.541>
- Ilmiah, R. (2017). Pengaruh Penambahan Abu Sekam Padi Sebagai Pozzolan Pada Binder Geopolimer Menggunakan Alkali Aktivator Sodium Silikat (Na_2SiO_3) Serta Sodium Hidroksida ($NaOH$).
- Indra Lesmana, R., Agus Nugroho, S., Jurusan Teknik Sipil, M., & Jurusan Teknik Sipil, D. (2016). Stabilitas Tanah Plastisitas Tinggi Dengan Semen. *Jom FTEKNIK*, 3(2), 1.
- Jafer, H., Atherton, W., Sadique, M., Ruddock, F., & Loffill, E. (2018). Stabilisation of soft soil using binary blending of high calcium fly ash and palm oil fuel ash. *Applied Clay Science*, 152(April 2017), 323–332. <https://doi.org/10.1016/j.clay.2017.11.030>
- Jeremiah, J. J., Abbey, S. J., Booth, C. A., & Kashyap, A. (2021). Geopolymers as Alternative Sustainable Binders for Stabilisation of Clays—A Review. *Geotechnics*, 1(2), 439–459. <https://doi.org/10.3390/geotechnics1020021>
- Kamaruddin, D. (2020). Improvement of marine clay soil using lime and alkaline activation stabilized with inclusion of treated coir fibre. *Applied Sciences (Switzerland)*, 10(6). <https://doi.org/10.3390/app10062129>
- Khale, D., & Chaudhary, R. (2007). Mechanism of Geopolymerization and Factors Influencing Its Development: A Review. *Journal of Materials*

- Science, 42, 729–746. <https://doi.org/10.1007/s10853-006-0401-4>
- Khasib, I. A., & Nik Daud, N. N. (2020). Physical and mechanical study of palm oil fuel ash (Pofa) based geopolymer as a stabilizer for soft soil. *Pertanika Journal of Science and Technology*, 28(Special Issue 2), 149–160. <https://doi.org/10.47836/pjst.28.S2.12>
- Khasib, I. A., Nik Daud, N. N., & Izadifar, M. (2023). Consolidation behaviour of palm-oil-fuel-ash-based geopolymer treated soil. *Geotechnical Research*, 10(3), 138–152. <https://doi.org/10.1680/jgere.23.00013>
- Khasib, I. A., Norsyahariati, N., Daud, N., Azline, N., & Nasir, M. (2021). Strength Development and Microstructural Behavior of Soils Stabilized with Palm Oil Fuel Ash (POFA)-Based Geopolymer. *Applied Sciences*, 11(8), p.3572. <https://doi.org/https://doi.org/10.3390/app11083572>
- Kim, D., & Park, S. (2011). Relationship between the subgrade reaction modulus and the strain modulus obtained using a plate loading test. *9th World Congress on Railway Research*, 11.
- Kimpraswil. (2002). Panduan Geoteknik 4. *Desain Dan Konstruksi*, 4.
- Krivenko, P. (2017). Why alkaline activation - 60 years of the theory and practice of alkali-activated materials. *Journal of Ceramic Science and Technology*, 8(3), 323–333. <https://doi.org/10.4416/JCST2017-00042>
- Kusuma, R. I., & Mina, E. (2017). Stabilisasi Tanah Dengan Menggunakan Fly Ash dan Pengaruhnya Terhadap Nilai Kuat Tekan Bebas (Studi Kasus Jalan Raya Bojonegara, Kab. Serang). *Fondasi : Jurnal Teknik Sipil*, 5(1). <https://doi.org/10.36055/jft.v5i1.1251>
- Kusuma, R. I., Mina, E., & O M, B. R. (2015). Stabilisasi Tanah Lempung dengan Menggunakan Abu Sawit terhadap Nilai Kuat Tekan Bebas (Studi Kasus Jalan Desa Cibeulah, Pandeglang). *Fondasi*, 4, 69–80.
- Kwandy, R., & Sentosa, G. S. (2019). Prediksi Penurunan Gedung Dan Daya Dukung Menggunakan Hasil Uji Plate Bearing Di Labuan Bajo, Ntt. *JMTS: Jurnal Mitra Teknik Sipil*, 2(2), 75. <https://doi.org/10.24912/jmts.v2i2.4296>
- Kwek, S. Y., Awang, H., & Cheah, C. B. (2021). Influence of liquid-to-solid and alkaline activator (Sodium silicate to sodium hydroxide) ratios on fresh and hardened properties of alkali-activated palm oil fuel ash geopolymer. *Materials*, 14(15). <https://doi.org/10.3390/ma14154253>
- Lahoti, M., Tan, K. H., & Yang, E.-H. (2019). A critical review of geopolymer properties for structural fire-resistance applications. *Construction and Building Materials*, 221, 514–526. <https://doi.org/https://doi.org/10.1016/j.conbuildmat.2019.06.076>
- Lanjewar, B. A., Chippagiri, R., Dakwale, V. A., & Ralegaonkar, R. V. (2023). Application of Alkali-Activated Sustainable Materials: A Step towards Net Zero Binder. *Energies*, 16(2). <https://doi.org/10.3390/en16020969>
- Latifi, N., Vahedifard, F., Ghazanfari, E., Horpibulsuk, S., Marto, A., & Williams, J. (2018). Sustainable Improvement of Clays Using Low-Carbon Nontraditional Additive. *International Journal of Geomechanics*, 18(3), 04017162. [https://doi.org/10.1061/\(asce\)gm.1943-5622.0001086](https://doi.org/10.1061/(asce)gm.1943-5622.0001086)
- Linares-Unamunzaga, A., Pérez-Acebo, H., Rojo, M., & Gonzalo-Orden, H.

- (2019). Flexural strength prediction models for soil-cement from Unconfined Compressive Strength at Seven Days. *Materials*, 12(3). <https://doi.org/10.3390/ma12030387>
- Lius, S., Sumarli, I., & Iskandar, A. (2020). Studi Literatur Korelasi Hasil Uji Berdasarkan Uji Plate Bearing dan Uji Dynamic Cone Penetrometer. *JMTS: Jurnal Mitra Teknik Sipil*, 3(4), 1157. <https://doi.org/10.24912/jmts.v3i4.8383>
- Luukkonen, T., Abdollahnejad, Z., Yliniemi, J., Kinnunen, P., & Illikainen, M. (2018). One-part alkali-activated materials: A review. *Cement and Concrete Research*, 103, 21–34. <https://doi.org/https://doi.org/10.1016/j.cemconres.2017.10.001>
- Marvila, M. T., Azevedo, A. R. G. de, & Vieira, C. M. F. (2021). Reaction mechanisms of alkali-activated materials. In *Revista IBRACON de Estruturas e Materiais* (Vol. 14). scielo .
- Megat Johari, M. A., Zeyad, A. M., Muhamad Bunnori, N., & Ariffin, K. S. (2012). Engineering and transport properties of high-strength green concrete containing high volume of ultrafine palm oil fuel ash. *Construction and Building Materials*, 30(May), 281–288. <https://doi.org/10.1016/j.conbuildmat.2011.12.007>
- Memon, F. A., Nuruddin, M. F., Khan, S., Shafiq, N., & Ayub, T. (2013). Effect of sodium hydroxide concentration on fresh properties and compressive strength of self-compacting geopolymers concrete. *Journal of Engineering Science and Technology*, 8(1), 44–56.
- Mina, E., Kusuma, R. I., & Ridwan, J. (2017). Stabilisasi Tanah Lempung Menggunakan Pasir Laut dan Pengaruhnya Terhadap Nilai Kuat Tekan Bebas (Studi Kasus :Jalan Mangkualam Kecamatan Cimanggu – Banten). *Jurnal Fondasi*, 6(2), 13–23. <https://doi.org/10.36055/jft.v6i2.2472>
- Miranda, T., Leitão, D., Oliveira, J., Corrêa-Silva, M., Araújo, N., Coelho, J., Fernández-Jiménez, A., & Cristelo, N. (2020). Application of alkali-activated industrial wastes for the stabilisation of a full-scale (sub)base layer. *Journal of Cleaner Production*, 242. <https://doi.org/10.1016/j.jclepro.2019.118427>
- Morsy, M. S., Alsayed, S. H., Al-Salloum, Y., & Almusallam, T. (2014). Effect of Sodium Silicate to Sodium Hydroxide Ratios on Strength and Microstructure of Fly Ash Geopolymer Binder. *Arabian Journal for Science and Engineering*, 39(6), 4333–4339. <https://doi.org/10.1007/s13369-014-1093-8>
- Mujah, D. (2016). Compressive strength and chloride resistance of grout containing ground palm oil fuel ash. *Journal of Cleaner Production*, 112, 712–722. <https://doi.org/10.1016/j.jclepro.2015.07.066>
- Munir, A., Abdullah, Huzaime, Sofyan, Irfandi, & Safwan. (2015). Utilization of palm oil fuel ash (POFA) in producing lightweight foamed concrete for non-structural building material. *Procedia Engineering*, 125, 739–746. <https://doi.org/10.1016/j.proeng.2015.11.119>
- Mustafa Al Bakri, A. M., Kamarudin, H., Bnhussain, M., Rafiza, A. R., & Zarina,

- Y. (2012). Effect of Na₂SiO₃/NaOH ratios and NaOH molarities on compressive strength of fly-ash-based geopolymers. *ACI Materials Journal*, 109(5), 503–508. <https://doi.org/10.14359/51684080>
- Nadziri, N., Ismail, I., & Hamdan, S. (2017). Binding gel characterization of alkali-activated binders based on palm oil fuel ash (POFA) and fly ash. *Journal of Sustainable Cement-Based Materials*, 7(1), 1–14. <https://doi.org/10.1080/21650373.2017.1299054>
- Nagy, A. C., Pasca, D. M., Farcas, V. S., Zaharia, G., & Bruchental, C. (2021). Determining the subgrade reaction modulus. Mathematical approach on case study. *IOP Conference Series: Earth and Environmental Science*, 727(1). <https://doi.org/10.1088/1755-1315/727/1/012009>
- Nik Daud, N. N., & Mohammed, A. S. (2014). Material characterization of palm oil fuel ash (POFA) mixed with granite residual soil. *Advanced Materials Research*, 955–959, 2093–2097. <https://doi.org/10.4028/www.scientific.net/AMR.955-959.2093>
- Ningrum, P., Husnah, & Husni Mubarak. (2022). Pengaruh Penambahan Abu Tandan Sawit pada Tanah Lempung berdasarkan Nilai Kuat Geser. *Aptek*, 14(1), 46–52. <https://doi.org/10.30606/aptek.v14i1.1104>
- Nodehi, M., & Taghvae, V. M. (2022a). Alkali-Activated Materials and Geopolymer: a Review of Common Precursors and Activators Addressing Circular Economy. *Circular Economy and Sustainability*, 2(1), 165–196. <https://doi.org/10.1007/s43615-021-00029-w>
- Nodehi, M., & Taghvae, V. M. (2022b). Alkali-Activated Materials and Geopolymer: a Review of Common Precursors and Activators Addressing Circular Economy. *Circular Economy and Sustainability*, 2(1), 165–196. <https://doi.org/10.1007/s43615-021-00029-w>
- Noorvand, H., Ali, A. A. A., Demirboga, R., Noorvand, H., & Farzadnia, N. (2013). Physical and chemical characteristics of unground palm oil fuel ash cement mortars with nanosilica. *Construction and Building Materials*, 48, 1104–1113. <https://doi.org/10.1016/j.conbuildmat.2013.07.070>
- Novia Yanti, R., & Hutasuhut, I. L. (2020). Potensi Limbah Padat Perkebunan Kelapa Sawit Di Provinsi Riau. *Wahana Forestra: Jurnal Kehutanan*, 15(2), 1–11. <https://doi.org/10.31849/forestra.v15i2.4696>
- Pacheco-Torgal, F., Castro-Gomes, J., & Jalali, S. (2008). Alkali-activated binders: A review. Part 1. Historical background, terminology, reaction mechanisms and hydration products. *Construction and Building Materials*, 22(7), 1305–1314. <https://doi.org/10.1016/j.conbuildmat.2007.10.015>
- Patankar, S. V., Ghugal, Y. M., & Jamkar, S. S. (2014). Effect of Concentration of Sodium Hydroxide and Degree of Heat Curing on Fly Ash-Based Geopolymer Mortar. *Indian Journal of Materials Science*, 2014, 1–6. <https://doi.org/10.1155/2014/938789>
- Pavithra, P., Srinivasula Reddy, M., Dinakar, P., Hanumantha Rao, B., Satpathy, B. K., & Mohanty, A. N. (2016). *Effect of the Na₂SiO₃/NaOH Ratio and NaOH Molarity on the Synthesis of Fly Ash-Based Geopolymer*

- Mortar . August, 336–344.
<https://doi.org/10.1061/9780784480151.034>
- Pedarla, A., Chittoori, S., & Puppala, A. (2011). Influence of mineralogy and plasticity index on the stabilization effectiveness of expansive clays. *Transportation Research Record*, 2212, 91–99.
<https://doi.org/10.3141/2212-10>
- Peraturan Pemerintah Nomor 22 Tahun 2021 Tentang Penyelenggaraan Perlindungan dan Pengelolaan Lingkungan Hidup, 483 (2021).
- Phoo-Ngernkham, T., Maegawa, A., Mishima, N., Hatanaka, S., & Chindaprasirt, P. (2015). Effects of sodium hydroxide and sodium silicate solutions on compressive and shear bond strengths of FA-GBFS geopolymers. *Construction and Building Materials*, 91, 1–8.
<https://doi.org/10.1016/j.conbuildmat.2015.05.001>
- Piew, S. H., & Shariff, S. M. (2016). Effects of Poha and Lime on Soft Soil Stabilization. *Special Issue Sci. Int. (Lahore)*, 29(2), 201–205.
- Pol Segura, I., Ranjbar, N., Juul Damø, A., Skaarup Jensen, L., Canut, M., & Arendt Jensen, P. (2023). A review: Alkali-activated cement and concrete production technologies available in the industry. *Heliyon*, 9(5), e15718. <https://doi.org/10.1016/j.heliyon.2023.e15718>
- Pourakbar, S., & Huat, B. K. (2017). A review of alternatives traditional cementitious binders for engineering improvement of soils. *Journal of Geotechnical Engineering*, 11(2), 206–216.
<https://doi.org/10.1080/19386362.2016.1207042>
- Pourakbar, Shahram, Asadi, A., Huat, B. B. K., & Fasihnikoutalab, M. H. (2015a). Soil stabilisation with alkali-activated agro-waste. *Environmental Geotechnics*, 2(6), 359–370.
<https://doi.org/10.1680/envgeo.15.00009>
- Pourakbar, Shahram, Asadi, A., Huat, B. B. K., & Fasihnikoutalab, M. H. (2015b). Stabilization of clayey soil using ultrafine palm oil fuel ash (POFA) and cement. *Transportation Geotechnics*, 3, 24–35.
<https://doi.org/10.1016/j.trgeo.2015.01.002>
- Pourakbar, Shahram, Huat, B. B. K., Asadi, A., & Fasihnikoutalab, M. H. (2016). Model Study of Alkali-Activated Waste Binder for Soil Stabilization. *International Journal of Geosynthetics and Ground Engineering*, 2(4). <https://doi.org/10.1007/s40891-016-0075-1>
- Prayitno Susanto, J., Dwi Santoso, A., Nawa Suwedi, D., Pusat Teknologi Lingkungan, P., Gedung, B., Puspiptek Serpong, K., & Selatan, T. (2017). Perhitungan Potensi Limbah Padat Kelapa Sawit untuk Sumber Energi Terbarukan dengan Metode LCA Palm Solid Wastes Potential Calculation for Renewable Energy with LCA Method. *Jurnal Teknologi Lingkungan*, 18(2), 165–172.
- Provis, J. L., & Van Deventer, J. S. J. (2009). Introduction to geopolymers. In *Geopolymers: Structures, Processing, Properties and Industrial Applications* (Issue 1940). Woodhead Publishing Limited.
<https://doi.org/10.1533/9781845696382.1>
- Provis, John L. (2018). Alkali-activated materials. *Cement and Concrete*

- Research, 114, 40–48.
<https://doi.org/https://doi.org/10.1016/j.cemconres.2017.02.009>
- Purbasari, A., Samadhi, T. W., & Bindar, Y. (2018). The effect of alkaline activator types on strength and microstructural properties of geopolymers from co-combustion residuals of bamboo and kaolin. *Indonesian Journal of Chemistry*, 18(3), 397–402.
<https://doi.org/10.22146/ijc.26534>
- Purdon, A. O. (1940). The Action of Alkalies on Blast-Furnace Slag. *Journal of the Society of Chemical Industry*, 59(9), 191–202.
- Qasim, A.-O., Al-Shamoosi, A., & Ahmed, A. (2017). Evaluation of soil bearing capacity by plate load test. *The 10th International Conference on the Bearing Capacity of Roads, Railways and Airfields*, June, 833–837.
<https://doi.org/10.1201/9781315100333-111>
- Qin, Y., Qu, C., Ma, C., & Zhou, L. (2022). One-Part Alkali-Activated Materials: State of the Art and Perspectives. *Polymers*, 14(22).
<https://doi.org/10.3390/polym14225046>
- Qureshi, M. N., & Ghosh, S. (2014). Effect of Si/Al ratio on engineering properties of alkali-activated GGBS pastes. *Green Materials*, 2(3), 123–131. <https://doi.org/10.1680/gmat.14.00001>
- Rahardjo, P. P. (1985). Correlation of CBR and Dynamic Cone Penetrometer Strength Measurement of Soil. *Konferensi Geoteknik Indonesia Ke 3*.
- Raharja, D. S., Hadiwardoyo, S. P., Rahayu, W., & Zain, N. (2017). Effect of mixing geopolymers and peat on bearing capacity in Ogan Komering Ilir (OKI) by California bearing ratio (CBR) test. *AIP Conference Proceedings*, 1855(June). <https://doi.org/10.1063/1.4985479>
- Rahayu, W., Damoerin, D., & Hayyan, A. (2018). Pengaruh Geopolimer Untuk Meningkatkan Kuat Geser Tanah Gambut. *Jurnal Teknik Sipil*, 25(3), 187. <https://doi.org/10.5614/jts.2018.25.3.3>
- Raja, M. N. A., & Shukla, S. K. (2021). Predicting the settlement of geosynthetic-reinforced soil foundations using evolutionary artificial intelligence technique. *Geotextiles and Geomembranes*, 49(5), 1280–1293. <https://doi.org/10.1016/j.geotexmem.2021.04.007>
- Ranjbar, N., Behnia, A., Alsubari, B., Moradi Birgani, P., & Jumaat, M. Z. (2016). Durability and mechanical properties of self-compacting concrete incorporating palm oil fuel ash. *Journal of Cleaner Production*, 112, 723–730. <https://doi.org/10.1016/j.jclepro.2015.07.033>
- Rauf, I., Samang, L., Harianto, T., & Arsyad, A. (2020). Correlation of ucs and cbr on lightweight geocomposite of soil-eps stabilized by waste of buton asphalt. *Materials Science Forum*, 998 MSF, 311–316. <https://doi.org/10.4028/www.scientific.net/MSF.998.311>
- Razali, M. R., & Wijaya, O. (2016). Nilai Cbr Pada Stabilisasi Tanah Dengan Semen Jalan Budi Utomo Unib Depan. *Jurnal Inersia Oktober*, 8(2), 67.
- Razeman, N. A., Itam, Z., Beddu, S., Izam, N. S. M. N., Ramli, M. Z., Syamsir, A., Mohamad, D., Kamal, N. L. M., Usman, F., & Asyraf, M. R. M. (2023). A Review on The Compressive Strength and Workability of Concrete with Agricultural Waste Ash as Cement Replacement Material. *IOP*

- Conference Series: Earth and Environmental Science*, 1135(1).
<https://doi.org/10.1088/1755-1315/1135/1/012058>
- Refi, A., & Elvanisa. (2016). Pengaruh Variasi Abu Cangkang Sawit terhadap Kembang Susut Tanah Lempung. *Teknik Sipil ITP*, 3(2), 1–10.
- Runyut, D. A., Robert, S., Ismail, I., Ahmadi, R., & Abdul Samat, N. A. S. binti. (2018). Microstructure and Mechanical Characterization of Alkali-Activated Palm Oil Fuel Ash. *Journal of Materials in Civil Engineering*, 30(7), 04018119. [https://doi.org/10.1061/\(asce\)mt.1943-5533.0002303](https://doi.org/10.1061/(asce)mt.1943-5533.0002303)
- Safiuddin, M., Salam, M. A., & Jumaat, M. Z. (2014). Key Fresh Properties of Self-Consolidating High-Strength POFA Concrete. In *Journal of Materials in Civil Engineering* (Vol. 26, Issue 1). [https://doi.org/10.1061/\(asce\)mt.1943-5533.0000782](https://doi.org/10.1061/(asce)mt.1943-5533.0000782)
- Salam, M. A., Safiuddin, M., & Jumaat, M. Z. (2013). Microstructure of self-consolidating high strength concrete incorporating palm oil fuel. *Pgysical Review & Research International*, 3(4), 674–687.
- Sariosseiri, F., & Muhunthan, B. (2009). Effect of cement treatment on geotechnical properties of some Washington State soils. *Engineering Geology*, 104(1–2), 119–125. <https://doi.org/10.1016/j.enggeo.2008.09.003>
- Secretariate of Directorate General of Estates. (2020). Tree Crop Estate Statistics of Idonesia 2018-2020. *Secretariate of Directorate General of Estates*, 1–82.
- Shankar H. Sanni, & R.B. Khadiranaikar. (2013). Performance of Alkaline Solutions on Grades of Geopolymer Concrete. *International Journal of Research in Engineering and Technology*, 02(13), 366–371. <https://doi.org/10.15623/ijret.2013.0213069>
- Shooshpasha, I., & Shirvani, R. A. (2015). Effect of cement stabilization on geotechnical properties of sandy soils. *Geomechanics and Engineering*, 8(1), 17–31. <https://doi.org/10.12989/gae.2015.8.1.017>
- Singh, S. P., Chowdhury, S., & Mishra, P. N. (2015). An Experimental Investigation on Strength Characteristics of Alkali Activated Fly Ash. *Procedia Earth and Planetary Science*, 11, 402–409. <https://doi.org/10.1016/j.proeps.2015.06.039>
- Sitinjak, J., Sarie, F., & Okrobianus Hendri, O. (2021). Stabilisasi Tanah Lempung Menggunakan Pasir Pantai Terhadap Nilai CBR. *Kacapuri*, 4(2), 45–52.
- Situmorang, A. P. P., Hendri, O., Teknik, F., Raya, U. P., Raya, P., Ratio, C. B., & Air, K. (2021). Korelasi Nilai Hasil Uji Kuat Tekan Bebas Dengan Nilai California Bearing Ratio (Cbr) Correlation of the Value of Unconfined Compressive Strength With California Bearing Ration (Cbr) Value of Clay Soil. *Transukma*, 4(1), 53–60.
- Standard, A. (2002). Earth-retaining structures AS 4678-2002. In *Australia* (p. 124). Standards Australia.
- Sukmak, P, Kunchariyakun, K., Sukmak, G., & ... (2019). Strength and microstructure of palm oil fuel ash–fly ash–soft soil geopolymers

- masonry units. *Journal of Materials in*
[https://doi.org/10.1061/\(ASCE\)MT.1943-5533.0002809](https://doi.org/10.1061/(ASCE)MT.1943-5533.0002809)
- Sukmak, Patimapon, Sukmak, G., Horpibulsuk, S., Setkit, M., Kassawat, S., & Arulrajah, A. (2019). Palm oil fuel ash-soft soil geopolymer for subgrade applications: strength and microstructural evaluation. *Road Materials and Pavement Design*, 20(1), 110–131.
<https://doi.org/10.1080/14680629.2017.1375967>
- Susanto, J. P., Santoso, A. D., & Suwedi, N. (2017). Perhitungan Potensi Limbah Padat Kelapa Sawit untuk Sumber Energi Terbarukan dengan Metode LCA. *Jurnal Teknologi Lingkungan*, 18(2), 165.
<https://doi.org/10.29122/jtl.v18i2.2046>
- Sutisna, J. R. (2014). Evaluasi Nilai CBR pada tanah dasar (Subgrade) Jalur Jalan Bandung-Cianjur Dengan Menggunakan alat Dynamic Cone Penetrometer. *Buletin Geologi Tata Lingkungan*, Vol 14(1).
- Syahril, Suratman, I., Subagio, B. S., & Siegfried. (2011). Pengaruh Stabilisasi Aspal Emulsi terhadap Karakteristik Lapisan Tanah Dasar yang Berasal dari Tanah Lunak. *Program Studi Teknik Sipil Fakultas Teknik Sipil Dan Lingkungan Institut Teknologi Bandung*, 11(1), 11–18.
- Tambunan, L. M., Olivia, M., & Saputra, E. (2016). Kuat Tekan Mortar Geopolimer POFA yang Dirawat Pada Suhu Ruang. *Jom FTEKNIK*, 3(1), 1–9.
- Terzaghi, K., Peck, R. B., & Mesri, G. (1996). Soil Mechanics in Engineering Practice.pdf. In *John wiley & sons* (p. 534).
- Thomas, B. S., Kumar, S., & Arel, H. S. (2017). Sustainable concrete containing palm oil fuel ash as a supplementary cementitious material – A review. *Renewable and Sustainable Energy Reviews*, 80(April), 550–561. <https://doi.org/10.1016/j.rser.2017.05.128>
- Torres-Carrasco, M., & Puertas, F. (2017). Alkaline activation of different aluminosilicates as an alternative to Portland cement: alkali activated cements or geopolymers. *Revista Ingenieria de Construccion*, 32(2), 5–12. <https://doi.org/10.4067/s0718-50732017000200001>
- Toyeb, M., Hakam, A., & Andriani, A. (2023). The strength and economic benefit of soil stabilization with Palm Oil Fuel Ash (POFA) as agro-waste. *E3S Web of Conferences*, 464, 11001.
- Toyeb, M., Hakam, A., Fauzan, F., & Andriani, A. (2023). PALM OIL FUEL ASH (POFA) AS AGRO-WASTE TO MODERN STABILIZATION ON SUBGRADE. *Jurnal Teknik Sipil*, 12(2), 165–171.
- Toyeb, M., & Mubarak, H. (2020). Analisis Balik Kuat Geser Tanah Terstabilisasi Semen Dengan Metode Numerik. *Racic*, 5(1), 48–57.
- Toyeb, M., Mubarak, H., Ningrum, P., & Gunawan, T. (2023). Decreasing the Soil Strength Stabilized Palm Oil Fuel Ash Based Alkali Activated Material in Peat Environment. *Racic*, 8(1), 148–157.
<https://doi.org/10.36341/racic.v8i1.3530>
- UI Islam, M. M., Mo, K. H., Alengaram, U. J., & Jumaat, M. Z. (2016). Durability properties of sustainable concrete containing high volume palm oil waste materials. *Journal of Cleaner Production*, 137, 167–177.

- <https://doi.org/10.1016/j.jclepro.2016.07.061>
- Umaru, I., B. Alkali, M.M. Alhaji, M. Alhassan, T.E. Adejumo, & A.H. Jagaba. (2023). Structural Design of Field Plate Load Test Equipment to Determine In situ Bearing Capacity and Settlement of Clayey Soil. *Construction*, 3(1), 23–39.
<https://doi.org/10.15282/construction.v3i1.9053>
- Utami, R., Putri, E. I. K., & Ekayani, M. (2018). Biaya Eksternal Dan Internalisasi Limbah Pabrik Kelapa Sawit. *Jurnal Pengelolaan Sumberdaya Alam Dan Lingkungan (Journal of Natural Resources and Environmental Management)*, 8(2), 143–150.
<https://doi.org/10.29244/jpsl.8.2.143-150>
- Vargas, J., & Halog, A. (2015). Effective carbon emission reductions from using upgraded fly ash in the cement industry. *Journal of Cleaner Production*, 103, 948–959.
<https://doi.org/https://doi.org/10.1016/j.jclepro.2015.04.136>
- Wang, Y., Liu, X., Zhang, W., Li, Z., Zhang, Y., Li, Y., & Ren, Y. (2020). Effects of Si/Al ratio on the efflorescence and properties of fly ash based geopolymers. *Journal of Cleaner Production*, 244.
<https://doi.org/10.1016/j.jclepro.2019.118852>
- Waruwu, A., Zega, O., Rano, D., Panjaitan, B. M. T., & Harefa, S. (2021). Kajian Nilai California Bearing Ratio (CBR) Pada Tanah lempung Lunak Dengan Variasi Tebal Stabilisasi Menggunakan Abu Vulkanik. *Jurnal Rekayasa Sipil (JRS-Unand)*, 17(2), 116.
<https://doi.org/10.25077/jrs.17.2.116-130.2021>
- Yusuf, M. O., Megat Johari, M. A., Ahmad, Z. A., & Maslehuddin, M. (2015). Evaluation of Slag-Blended Alkaline-Activated Palm Oil Fuel Ash Mortar Exposed to the Sulfuric Acid Environment. *Journal of Materials in Civil Engineering*, 27(12), 04015058.
[https://doi.org/10.1061/\(asce\)mt.1943-5533.0001315](https://doi.org/10.1061/(asce)mt.1943-5533.0001315)