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**Evaluasi Pengelolaan Air Dewatering terhadap Kesiapan Pekerjaan Bottom Slab pada Open Caisson (Studi
Kasus: Proyek Jakarta Sewerage Development Project Zona 1 Paket 3)**
Ahmad Ilham Rizaldi Danishwara, Dr. Ir. Sindu Nuranto, M.S., C.Ws., IPU.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

INTISARI

Pada konstruksi *open caisson*, tahapan pekerjaan dengan metode *press-in* dan *wet excavation* menghasilkan air yang mengandung sedimen dan material konstruksi yang perlu dikeluarkan melalui proses *dewatering* serta diolah sebelum dibuang ke lingkungan. Pengelolaan air pada tahap tersebut perlu dievaluasi berdasarkan kemampuannya memenuhi persyaratan kualitas air serta keterkaitannya dengan kesiapan area kerja untuk pekerjaan *bottom slab*. Penelitian ini bertujuan menganalisis efektivitas pengelolaan air *dewatering*, pengaruhnya terhadap kesiapan pekerjaan *bottom slab*, serta mengevaluasi kelayakan sistem yang diterapkan pada pekerjaan *open caisson*.

Penelitian dilakukan pada Jakarta Sewerage Development Project (JSDP) Zona 1 Paket 3 dengan membandingkan dua sistem pengelolaan air limbah konstruksi, yaitu *sedimentation tank* pada Open Caisson C-26.0 dan *in situ treatment* pada Open Caisson C-24.2. Data yang dianalisis meliputi kualitas air, durasi pekerjaan, kebutuhan area kerja, biaya operasional, dan kemudahan pelaksanaan. Evaluasi dilakukan menggunakan pendekatan *Multi-Criteria Decision Making* (MCDM), dengan metode *Analytical Hierarchy Process* (AHP) untuk menentukan bobot kriteria dan *Simple Additive Weighting* (SAW) untuk menilai dan merangking alternatif, kemudian dilanjutkan dengan analisis sensitivitas.

Hasil penelitian menunjukkan bahwa kedua sistem mampu memenuhi sebagian besar persyaratan kualitas lingkungan dan menghasilkan *sludge* yang tergolong non-B3 berdasarkan uji TCLP. Perbedaan sistem pengelolaan memengaruhi durasi *treatment*, *dewatering*, dan *sludge cleaning* serta waktu kesiapan area kerja untuk pekerjaan *bottom slab*. Hasil evaluasi multikriteria menunjukkan bahwa sistem *in situ treatment* memiliki tingkat kelayakan lebih tinggi dibandingkan *sedimentation tank* pada kondisi proyek yang diteliti. Uji sensitivitas menunjukkan bahwa perubahan bobot kriteria tidak mengubah peringkat alternatif sehingga hasil evaluasi menunjukkan kestabilan.

Kata kunci: *open caisson, dewatering, sedimentation tank, in situ treatment*, AHP, MCDM.

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ABSTRACT

In open caisson construction, work stages using the press-in and wet excavation methods generate water containing sediment and construction materials that must be removed through dewatering and treated before discharge to the environment. The water management process at this stage needs to be evaluated based on its ability to meet water quality requirements and its relationship to work area readiness for bottom slab construction. This study aims to analyze the effectiveness of dewatering water management, its effect on bottom slab work readiness, and the feasibility of the system implemented in open caisson construction.

The study was conducted at the Jakarta Sewerage Development Project (JSDP) Zone 1 Package 3 by comparing two construction wastewater management systems, namely sedimentation tank at Open Caisson C-26.0 and in situ treatment at Open Caisson C-24.2. The analyzed data included water quality, work duration, workspace requirements, operational costs, and constructability. The evaluation employed a Multi-Criteria Decision Making (MCDM) approach, using the Analytical Hierarchy Process (AHP) to determine the criteria weights and Simple Additive Weighting (SAW) to evaluate and rank the alternatives, followed by sensitivity analysis.

The results showed that both systems met most of the applicable environmental quality requirements and produced sludge classified as non-hazardous based on TCLP testing. Differences in the water management systems affected the duration of treatment, dewatering, and sludge cleaning, as well as the time required to prepare the work area for bottom slab construction. The multi-criteria evaluation showed that the in situ treatment system had a higher feasibility level than the sedimentation tank system under the project conditions studied. Sensitivity analysis showed that changes in criteria weights did not alter the ranking of the alternatives, indicating stable evaluation results.

Keywords: open caisson, dewatering, sedimentation tank, in situ treatment, AHP, MCDM.