

DAFTAR ISI

LEMBAR HAK CIPTA	Error! Bookmark not defined.
HALAMAN PENGESAHAN	Error! Bookmark not defined.
HALAMAN PERNYATAAN	Error! Bookmark not defined.
KATA PENGANTAR	Error! Bookmark not defined.
UCAPAN TERIMA KASIH	Error! Bookmark not defined.
ABSTRAK	Error! Bookmark not defined.
ABSTRACT	Error! Bookmark not defined.
DAFTAR ISI	ix
DAFTAR GAMBAR	xiii
DAFTAR TABEL	xviii
BAB I PENDAHULUAN	Error! Bookmark not defined.
1.1. Latar Belakang	Error! Bookmark not defined.
1.2. Identifikasi Masalah	Error! Bookmark not defined.
1.3. Batasan Masalah.....	Error! Bookmark not defined.
1.4. Rumusan Masalah	Error! Bookmark not defined.
1.5. Tujuan Penelitian.....	Error! Bookmark not defined.
1.6. Manfaat Penelitian.....	Error! Bookmark not defined.
1.7. Sistematika Penulisan.....	Error! Bookmark not defined.
BAB II KAJIAN PUSTAKA	Error! Bookmark not defined.
2.1. Instrumen Geoteknik	Error! Bookmark not defined.
2.1.1. Piezometer	Error! Bookmark not defined.
2.1.2. Inclinomater	Error! Bookmark not defined.
2.1.3. Settlement Meter.....	Error! Bookmark not defined.

2.1.4. V-Notch Weir	Error! Bookmark not defined.
2.1.5. Gedung Instrumentasi (<i>Instrumentation House</i>). Error! Bookmark not defined.	
2.2. Bendungan (Dam)	Error! Bookmark not defined.
2.2.1. Data Bendungan Jatigede.....	Error! Bookmark not defined.
2.3. Stabilitas Bendungan	Error! Bookmark not defined.
2.3.1. Faktor Keamanan Minimum.....	Error! Bookmark not defined.
2.3.2. Penurunan Bendungan (Settlement)	Error! Bookmark not defined.
2.3.3. Rembesan (<i>Seepage</i>).....	Error! Bookmark not defined.
2.4. Initial Impounding	Error! Bookmark not defined.
2.5. Sudden Drawdown	Error! Bookmark not defined.
2.6. Finite Elemen Method dan Limit Equilibrium	Error! Bookmark not defined.
2.6.1. Parameter Program Plaxis 8.6.....	Error! Bookmark not defined.
BAB III METODOLOGI PENELITIAN	Error! Bookmark not defined.
3.1. Lokasi dan Sampel Penelitian	Error! Bookmark not defined.
3.2. Metode Penelitian.....	Error! Bookmark not defined.
3.3. Prosedur Penelitian.....	Error! Bookmark not defined.
3.3.1. Uraian Prosedur Penelitian	Error! Bookmark not defined.
3.4. Langkah-langkah Penelitian	Error! Bookmark not defined.
3.4.1. Vibrating Wire Piezometer	Error! Bookmark not defined.
3.4.2. Inclinomometer dan Settlement Meter.....	Error! Bookmark not defined.
3.4.3. V-Notch Weir	Error! Bookmark not defined.
3.4.4. Finite Elemen Method (Plaxis 8.6).....	Error! Bookmark not defined.

3.4.4.1. Investigasi Geologi Pondasi dan Investigasi Material Bendungan **Error! Bookmark not defined.**

3.4.5. Limit Euilibrium (Geostudio 2007)**Error! Bookmark not defined.**

3.5. Alat dan Teknik Pengumpul Data**Error! Bookmark not defined.**

3.5.1. Alat Pengumpulan Data**Error! Bookmark not defined.**

3.5.2. Teknik Pengumpulan Data.....**Error! Bookmark not defined.**

BAB IV HASIL PENELITIAN DAN PEMBAHASAN.....Error! Bookmark not defined.

4.1. Pemodelan Finite Element Methode (Plaxis 8.6) **Error! Bookmark not defined.**

4.1.1. Analisis Pore Pressure Pemodelan FEM Bendungan Jatigede **Error! Bookmark not defined.**

4.1.2. Analisis Settlement Pemodelan FEM Bendungan Jatigede **Error! Bookmark not defined.**

4.1.3. Analisis Pergeseran Pemodelan FEM Bendungan Jatigede **Error! Bookmark not defined.**

4.1.4. Analisis Seepage Pemodelan FEM Bendungan Jatigede..... **Error! Bookmark not defined.**

4.1.5. Analisis Faktor Keamanan Bendungan.**Error! Bookmark not defined.**

4.2. Pemodelan *Limit Equilibrium* (Geostudio 2007) **Error! Bookmark not defined.**

4.2.1. Analisis *Seepage* Bendungan dengan SEEP/W .. **Error! Bookmark not defined.**

4.2.2. Analisis Stabilitas Bendungan SLOPE/W **Error! Bookmark not defined.**

4.3. Vibrating Wire Piezometer.....**Error! Bookmark not defined.**

4.4. V-Notch Weir**Error! Bookmark not defined.**

4.5. Inclinomater.....	Error! Bookmark not defined.
4.6. Settlement Meter	Error! Bookmark not defined.
4.7. Pembahasan Hasil Penelitian.....	Error! Bookmark not defined.
4.7.1. Analisis <i>Pore Pressure</i> Bendungan Akibat <i>Initial Impounding</i> ...	Error! Bookmark not defined.
4.7.2. Analisis <i>Seepage</i> Bendungan Akibat <i>Initial Impounding</i>	Error! Bookmark not defined.
4.7.3. Analisis <i>Settlement</i> Bendungan Akibat <i>Initial Impounding</i>	Error! Bookmark not defined.
4.7.4. Analisis Pergeseran Bendungan Akibat <i>Initial Impounding</i>	Error! Bookmark not defined.
4.7.5. Analisis <i>Safety Factor</i> Bendungan Akibat <i>Initial Impounding</i>	Error! Bookmark not defined.

BAB V SIMPULAN, IMPLIKASI DAN REKOMENDASIError! Bookmark not defined.

5.1. Simpulan.....	Error! Bookmark not defined.
5.2. Impilkasi dan Rekomendasi	Error! Bookmark not defined.

DAFTAR PUSTAKAError! Bookmark not defined.

LAMPIRAN.....Error! Bookmark not defined.

LAMPIRAN A As Built of Dam Instrumentation & Cross Section of Dam
Instrumentation Sta. 1+100

LAMPIRAN B Data Vibrating Wire Piezometer

LAMPIRAN C Data Settlement Meter VC 1

LAMPIRAN D Data Inclinomater VC 1 & VC 2

LAMPIRAN E Data V-Notch Weir

LAMPIRAN F FEM Settlement

LAMPIRAN G FEM Inclinometer

LAMPIRAN H FEM & LEM Seepage

LAMPIRAN I Stabilitas Bendungan FEM & LEM

LAMPIRAN J Dokumentasi Lapangan

DAFTAR GAMBAR

Gambar 2. 1 Vibrating Wire Piezometer.....	Error! Bookmark not defined.
Gambar 2. 2 Vibrating Wire Data Recorder	Error! Bookmark not defined.
Gambar 2. 3 Piezometer Cassagrande.....	Error! Bookmark not defined.
Gambar 2. 4 Water Level Indicator Probe	Error! Bookmark not defined.
Gambar 2. 5 Biaxial Inclinator System	Error! Bookmark not defined.
Gambar 2. 6 Datum	Error! Bookmark not defined.
Gambar 2. 7 Plate Magnet.....	Error! Bookmark not defined.

xiii

Tria Fajri Jauhari, 2017

PENGARUH INITIAL IMPOUNDING TERHADAP STABILITAS BENDUNGAN JATIGEDE BERBASIS INSTRUMENTASI GEOTEKNIK

Universitas Pendidikan Indonesia | repository.upi.edu | perpustakaan.upi.edu

- Gambar 2. 8 Settlement Meter**Error! Bookmark not defined.**
- Gambar 2. 9 Ilustrasi Instalasi V-Notch.....**Error! Bookmark not defined.**
- Gambar 2. 10 V-Notch 1**Error! Bookmark not defined.**
- Gambar 2. 11 Instrumentation House**Error! Bookmark not defined.**
- Gambar 2. 12 Lokasi Pemasangan Instrumen di Main Dam**Error! Bookmark not defined.**
- Gambar 2. 13 Bidang Gelincir Metode Fellenius ..**Error! Bookmark not defined.**
- Gambar 2. 14 Kurva hubungan α dengan $M_{t(\alpha)}$ dengan variasi $(\tan \phi/SF)$ **Error! Bookmark not defined.**
- Gambar 2. 15 Garis Jaringan Aliran**Error! Bookmark not defined.**
- Gambar 2. 16 Peta Genangan Waduk Jatigede**Error! Bookmark not defined.**
- Gambar 2. 17 Kondisi Sudden Drawdown**Error! Bookmark not defined.**
- Gambar 2. 18 Approximation Correlations Between Undrained Shear Strength and Standard Penetration Test N-Values (After Terzaghi and Peck, 1967 and Sower, 1979).....**Error! Bookmark not defined.**
- Gambar 2. 19 Hubungan antara N_{cor} dengan ϕ (phi) oleh Hanaka & Uchida, 1996**Error! Bookmark not defined.**
- Gambar 3. 1 Peta Lokasi Bendungan Jatigede.....**Error! Bookmark not defined.**
- Gambar 3. 2 Lokasi Instrumentasi Bendungan Jatigede di Sta. 1+100 **Error! Bookmark not defined.**
- Gambar 3. 3 Prosedur Penelitian.....**Error! Bookmark not defined.**
- Gambar 3. 4 Plan View Bendungan Jatigede.....**Error! Bookmark not defined.**
- Gambar 3. 5 Geometri V-Notch Weir 3**Error! Bookmark not defined.**
- Gambar 3. 6 Stratifikasi dan Parameter Batuan BOR NO: RB.02 **Error! Bookmark not defined.**
- Gambar 3. 7 Stratifikasi dan Parameter Batuan BOR NO: RB.03 **Error! Bookmark not defined.**
- Gambar 3. 8 Material Pondasi Bendungan (General set) Untuk Input Program Plaxis 8.6**Error! Bookmark not defined.**
- Gambar 3. 9 Material Pondasi Bendungan (Parameters set) Untuk Input Program Plaxis 8.6**Error! Bookmark not defined.**

Gambar 3. 10 Kotak Dialog Create/Open project..**Error! Bookmark not defined.**

Gambar 3. 11 Lembar Tab Project Pada Kotak Dialog General Setting..... **Error!**
Bookmark not defined.

Gambar 3. 12 Lembar Tab Dimensi pada Kotak Dialog Pengaturan Global. **Error!**
Bookmark not defined.

Gambar 3. 13 Geometri Bendungan Jatigede**Error! Bookmark not defined.**

Gambar 3. 14 Kotak Dialog Material Set**Error! Bookmark not defined.**

Gambar 3. 15 Tab General Pada Kotak Dialog Material Set Core Zone 1 **Error!**
Bookmark not defined.

Gambar 3. 16 Tab Parameters Pada Kotak Dialog Material Set Core Zone 1**Error!**
Bookmark not defined.

Gambar 3. 17 Tab Interfaces Pada Kotak Dialog Material Set Core Zone 1. **Error!**
Bookmark not defined.

Gambar 3. 18 Soil & Interfaces Pada Kotak Dialog Material Set **Error!**
Bookmark not defined.

Gambar 3. 19 Geometri Bendungan Jatigede Setelah Terisi Material..... **Error!**
Bookmark not defined.

Gambar 3. 20 Generate Mesh Bendungan Jatigede**Error! Bookmark not
defined.**

Gambar 3. 21 Muka Air Bendungan Kondisi Awal**Error! Bookmark not
defined.**

Gambar 3. 22 Generate Water Pressure Kondisi Awal**Error! Bookmark not
defined.**

Gambar 3. 23 Lembar Tab General Pada Proses Kalkulasi Elevasi +241 **Error!**
Bookmark not defined.

Gambar 3. 24 Lembar Tab Parameters Pada Proses Kalkulasi MAW +241 . **Error!**
Bookmark not defined.

Gambar 3. 25 Geometri Bendungan Sebelum Input MAW +241..... **Error!**
Bookmark not defined.

Gambar 3. 26 Muka Air Waduk Elv. +241**Error! Bookmark not defined.**

Gambar 3. 27 Generate Water Pressure MAW +241	Error! Bookmark not defined.
Gambar 3. 28 Muka Air Waduk Elv. +250	Error! Bookmark not defined.
Gambar 3. 29 Muka Air Waduk Elv. +260	Error! Bookmark not defined.
Gambar 3. 30 Muka Air Waduk Elv. +262	Error! Bookmark not defined.
Gambar 3. 31 Muka Air Waduk Elv. +204 (Sudden Drawdown)	Error! Bookmark not defined.
Gambar 3. 32 Kalkulasi MAW +241 sampai Kondisi Sudden Drawdown ...	Error! Bookmark not defined.
Gambar 3. 33 Tampilan create/new a new project	Error! Bookmark not defined.
Gambar 3. 34 KeyIn Analysis	Error! Bookmark not defined.
Gambar 3. 35 Setting Slip Surface	Error! Bookmark not defined.
Gambar 3. 36 Geometri Bendungan	Error! Bookmark not defined.
Gambar 3. 37 Set Units and Scale	Error! Bookmark not defined.
Gambar 3. 38 Set Page	Error! Bookmark not defined.
Gambar 3. 39 Set Axes	Error! Bookmark not defined.
Gambar 3. 40 Set Axis Size	Error! Bookmark not defined.
Gambar 3. 41 Set Axes	Error! Bookmark not defined.
Gambar 3. 42 Input Material	Error! Bookmark not defined.
Gambar 3. 43 Input Draw Material	Error! Bookmark not defined.
Gambar 3. 44 Phreatic Line	Error! Bookmark not defined.
Gambar 3. 45 Grid Dan Radius	Error! Bookmark not defined.
Gambar 3. 46 Verify/Optimized	Error! Bookmark not defined.
Gambar 3. 47 Solve Analyses	Error! Bookmark not defined.
Gambar 3. 48 Hasil Perhitungan SLOPE/W	Error! Bookmark not defined.
Gambar 3. 49 KeyIn SEEP/W	Error! Bookmark not defined.
Gambar 3. 50 Geometri Bendungan	Error! Bookmark not defined.
Gambar 3. 51 Material Properties Tubuh dan Pondasi Bendungan	Error! Bookmark not defined.
Gambar 3. 52 Input Material	Error! Bookmark not defined.
Gambar 3. 53 Boundary Condition	Error! Bookmark not defined.

Gambar 3. 54 Assign Boundary Condition	Error! Bookmark not defined.
Gambar 3. 55 Flux Section.....	Error! Bookmark not defined.
Gambar 3. 56 Verify Data.....	Error! Bookmark not defined.
Gambar 3. 57 Kalkulasi SEEP/W	Error! Bookmark not defined.
Gambar 3. 58 Total Head dan Besar Rembesan	Error! Bookmark not defined.
Gambar 4. 1 Posisi Instrumentasi pada Cross Section Bendungan Jatigede Sta. 1+100.....	Error! Bookmark not defined.
Gambar 4. 2 Kondisi Pore Pressure dengan MAW +241 m	Error! Bookmark not defined.
Gambar 4. 3 Pore Pressure di area PP 1 dengan FEM MAW +241	Error! Bookmark not defined.
Gambar 4. 4 Pore Pressure di area PP 2 s.d. PP 3 dengan FEM MAW +241	Error! Bookmark not defined.
Gambar 4. 5 Pore Pressure di area PP 4 s.d. PP 6 dengan FEM MAW +241	Error! Bookmark not defined.
Gambar 4. 6 Pore Pressure di area PP 7 s.d. PP 11 dengan FEM MAW +241	Error! Bookmark not defined.
Gambar 4. 7 Pore Pressure di area PP 14 s.d. PP 16 dengan FEM MAW +241	Error! Bookmark not defined.
Gambar 4. 8 Settlement Bendungan Jatigede dengan FEM untuk MAW +241 m	Error! Bookmark not defined.
Gambar 4. 9 Settlement pada VC 1 Bendungan Jatigede dengan MAW +241 m	Error! Bookmark not defined.
Gambar 4. 10 Settlement pada VC 2 Bendungan Jatigede dengan MAW+241 m	Error! Bookmark not defined.
Gambar 4. 11 Analisis Pergeseran Bendungan Jatigede dengan FEM untuk MAW +241 m.....	Error! Bookmark not defined.
Gambar 4. 12 Analisis Pergeseran pada VC 1 Bendungan Jatigede dengan MAW +241 m.....	Error! Bookmark not defined.
Gambar 4. 13 Analisis Pergeseran pada VC 2 Bendungan Jatigede dengan MAW +241 m.....	Error! Bookmark not defined.

- Gambar 4. 14 Phreatic Line dan Seepage Bendungan Jatigede dengan FEM untuk
MAW +241 m**Error! Bookmark not defined.**
- Gambar 4. 15 Seepage Bendungan Jatigede dengan FEM untuk MAW +241 m di
Bagian Toe Dam.....**Error! Bookmark not defined.**
- Gambar 4. 16 Hasil Perhitungan Nilai Safety Factor untuk Kondisi MAW
+241 m.....**Error! Bookmark not defined.**
- Gambar 4. 17 Seepage Bendungan Jatigede dengan MAW +241 **Error!
Bookmark not defined.**
- Gambar 4. 18 Seepage Bendungan Jatigede dengan MAW +250 **Error!
Bookmark not defined.**
- Gambar 4. 19 Safety Factor Metode Ordinary Elevasi MAW +241 m **Error!
Bookmark not defined.**
- Gambar 4. 20 Safety Factor Metode Ordinary Elevasi MAW +250 m **Error!
Bookmark not defined.**
- Gambar 4. 21 Elevation of Hydrostatic Head PP 4, PP 5, PP 6 Saat Konstruksi dan
Pasca Konstruksi**Error! Bookmark not defined.**
- Gambar 4.22 Elevation of Hydrostatic Head PP 4, PP 5, PP 6 Initial
Impounding.....**Error! Bookmark not defined.**
- Gambar 4. 23 Keadaan Seepage Pasca Konstruksi Dan Initial Impounding V-
Notch Weir 1**Error! Bookmark not defined.**
- Gambar 4. 24 Keadaan Seepage Pasca Konstruksi Dan Initial Impounding V-
Notch Weir 3**Error! Bookmark not defined.**
- Gambar 4. 25 Pergeseran Pasca Konstruksi Dan Initial Impounding VC 1 .. **Error!
Bookmark not defined.**
- Gambar 4.26 Kenaikan Pergeseran Pasca Konstruksi Dan Initial Impounding
VC 1.....**Error! Bookmark not defined.**
- Gambar 4.27 Pergeseran Pasca Konstruksi Dan Initial Impounding VC 1
(Plan View).....**Error! Bookmark not defined.**
- Gambar 4. 28 Pergeseran Pasca Konstruksi Dan Initial Impounding VC 2 .. **Error!
Bookmark not defined.**

Gambar 4. 29 Kenaikan Pergeseran Pasca Konstruksi Dan Initial Impounding VC 2.....**Error! Bookmark not defined.**

Gambar 4. 30 Pergeseran Pasca Konstruksi Dan Initial Impounding VC 2 (Plan View)**Error! Bookmark not defined.**

Gambar 4. 31 Settlement Value Terhadap Waktu Tiap Plat Magnet (Konstruksi s.d Initial Impounding)**Error! Bookmark not defined.**

Gambar 4. 32 Besaran Settlement Terhadap Initial Elevation Plat Magnet .. **Error! Bookmark not defined.**

Gambar 4. 33 Perbandingan Pore Pressure di Tubuh Bendungan (PP) MAW**Error! Bookmark not defined.**

Gambar 4. 34 Perbandingan Pore Pressure di Tubuh Bendungan (PP) MAW**Error! Bookmark not defined.**

Gambar 4. 35 Perbandingan Pore Pressure Foundation Piezometer (FP) MAW**Error! Bookmark not defined.**

Gambar 4. 36 Perbandingan Pore Pressure Foundation Piezometer (FP) MAW**Error! Bookmark not defined.**

Gambar 4. 37 Perbandingan Pore Pressure Embankment Piezometer MAW **Error! Bookmark not defined.**

Gambar 4. 38 Perbandingan Pore Pressure Embankment Piezometer MAW **Error! Bookmark not defined.**

Gambar 4. 39 Kondisi Air rembesan di V-Notch Weir 1**Error! Bookmark not defined.**

Gambar 4. 40 Flow Net Elevasi +241 M**Error! Bookmark not defined.**

Gambar 4. 41 Penurunan Instrumentasi selama Initial Impounding..... **Error! Bookmark not defined.**

DAFTAR TABEL

- Tabel 2. 1 *Factor of Safety for Dam Walls***Error! Bookmark not defined.**
- Tabel 2. 2 *Tolerable Pergeseran (after Duncan and Wright, 2005)*..... **Error! Bookmark not defined.**
- Tabel 2. 3 Hubungan antara Jenis Bahan Tanah dan Angka Kompresinya... **Error! Bookmark not defined.**
- Tabel 2. 4 Typical Potential Self Weight Settlement**Error! Bookmark not defined.**
- Tabel 2. 5 Modulus Elastisitas**Error! Bookmark not defined.**
- Tabel 2. 6 Poisson Ratio Untuk Berbagai Jenis Tanah**Error! Bookmark not defined.**
- Tabel 2. 7 Korelasi Nilai N-SPT Terhadap Berat Isi, Sudut Geser Dalam, dan Kepadatan Relatif Pada Tanah non-Kohesif**Error! Bookmark not defined.**
- Tabel 2. 8 Korelasi Nilai N-SPT Terhadap Berat Isi, Unconfined Compressive Strength (UCS), dan Kepadatan Relatif Pada Tanah Kohesif..... **Error! Bookmark not defined.**
- Tabel 2. 9 Estimated Physico-mechanical Property of Each Rock Class **Error! Bookmark not defined.**

Tabel 3. 1 Material Tubuh Bendungan (General set) Untuk Input Program Plaxis 8.6.....	Error! Bookmark not defined.
Tabel 3. 2 Material Tubuh Bendungan (Parrameters set) Untuk Input Program Plaxis 8.6.....	Error! Bookmark not defined.
Tabel 3. 3 Stratifikasi dan Parameter Batuan BOR NO: RB.01	Error! Bookmark not defined.
Tabel 3. 4 Data Material Bendungan	Error! Bookmark not defined.
Tabel 3. 5 Material Tubuh Bendungan untuk Input Program SEEP/W.....	Error! Bookmark not defined.
Tabel 3. 6 Form Data Vibrating Wire Piezometer	Error! Bookmark not defined.
Tabel 3. 7 Form Data Incinometer	Error! Bookmark not defined.
Tabel 3. 8 Form Data Settlement Meter.....	Error! Bookmark not defined.
Tabel 3. 9 Form Data V-Notch Weir	Error! Bookmark not defined.
Tabel 4. 1 Resume Pore Pressure pada EP 1 s.d. EP 6 (Finite Elemen Method)	Error! Bookmark not defined.
Tabel 4. 2 Resume <i>Pore Pressure</i> pada PP 1 s.d. PP 16 (<i>Finite Elemen Method</i>)	Error! Bookmark not defined.
Tabel 4. 3 Resume <i>Pore Pressure</i> pada FP 1 s.d. FP 12 (<i>Finite Elemen Method</i>)	Error! Bookmark not defined.
Tabel 4. 4 Settlement Value pada VC 1 dan VC 2 (Finite Elemen Method).	Error! Bookmark not defined.
Tabel 4. 5 Resume Pergeseran FEM.....	Error! Bookmark not defined.
Tabel 4. 6 Resume Seepage FEM	Error! Bookmark not defined.
Tabel 4. 7 Resume Nilai Safety Factor Bendungan Jatigede (FEM)	Error! Bookmark not defined.
Tabel 4. 8 Resume Analisis Safety Factor Limit Equilibrium SLOPE/W.....	Error! Bookmark not defined.
Tabel 4. 9 Perbandingan Seepage Bendungan Jatigede	Error! Bookmark not defined.
Tabel 4. 10 Perbandingan Settlement Bendungan Jatigede	Error! Bookmark not defined.

Tabel 4. 11 Penurunan Izin Bendungan Jatigede...**Error! Bookmark not defined.**

Tabel 4. 12 Perbandingan Pergeseran Bendungan Jatigede**Error! Bookmark not defined.**

Tabel 4. 13 Pergeseran Izin untuk Bendungan.....**Error! Bookmark not defined.**

Tabel 4. 14 Safety Factor Bendungan Jatigede.....**Error! Bookmark not defined.**