

SURAT KETERANGAN
MELAKUKAN KEGIATAN PENGABDIAN KEPADA MASYARAKAT
INSTITUT TEKNOLOGI NASIONAL
No. 301/C.02.01/LPPM/V/2021

Yang bertanda tangan di bawah ini,

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Jabatan : Kepala
Unit Kerja : LPPM-Itenas
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4	Dr. Yuki Achmad Yakin, S.T., M.T.	20140601	Tenaga Ahli
5	Desti Santi Pratiwi, S.T., M.T.	20190804	Tenaga Ahli
6	Badriana Nuranita, S.T., M.T.	20200201	Tenaga Ahli
7	Rinaldi Alamsyah, S.T.	-	Tenaga Ahli

Telah melakukan kegiatan Pengabdian kepada Masyarakat sebagai berikut:

Nama Kegiatan : NGC Plaxis Training Series #2 Plaxis 2D Training
Tempat : Webinar/Zoom Meeting
Waktu : 21 – 23 April 2021
Sumber Dana : RKAT Prodi Teknik Sipil Tahun 2020

Demikian surat keterangan ini dibuat untuk dapat dipergunakan sebagaimana mestinya.

Bandung, 19 Mei 2021

Lembaga Penelitian dan Pengabdian
kepada Masyarakat (LPPM) Itenas
Kepala,

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LAPORAN KEGIATAN PENGABDIAN KEPADA MASYARAKAT



NGC PLAXIS TRAINING SERIES #2 PLAXIS 2D TRAINING

Ketua Tim :

Dr. techn. Indra Noer Hamdhan, ST., MT.

Anggota Tim :

**Ikhya, ST., MT., M.M.
Imam Aschuri, Ph. D.
Dr. Yuki Achmad Yakin, ST., MT.
Desti Santi Pratiwi, ST., MT.
Badriana Nuranita, ST., MT.
Rinaldy Alamsyah, ST.**

**Program Studi Teknik Sipil
Fakultas Teknik Sipil dan Perencanaan
Institut Teknologi Nasional
Bandung**

2021

HALAMAN PENGESAHAN

Judul : NGC Plaxis Training Series #2: Plaxis 2D Training

Ketua Tim Pengusul

Nama : Dr. techn. Indra Noer Hamdhan

NIP : 11785

Jabatan/Golongan : Lektor / IIID

Jurusan/Fakultas : Teknik Sipil / Fakultas Teknik Sipil dan Perencanaan

Bidang Keahlian : Rekayasa Geoteknik

Alamat Kantor : Jl. PHH Mustofa No. 23 Bandung

Lokasi Kegiatan

Wilayah Mitra : Provinsi Jawa Barat

Desa/Kecamatan : -

Kota/Kabupaten : Kota Bandung

Provinsi : Jawa Barat

Jarak PT ke Mitra : -

Luaran : -

Waktu Pelaksanaan : 21 April – 23 April 2021

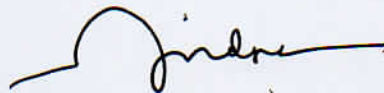
Total Biaya : Rp10.000.000,00

Bandung, 30 April 2021

Mengetahui,
Dekan Fakultas

 **itenas**
FTSP
(Dr. Soni Darmawan)

Ketua Tim Pengusul



(Dr. techn. Indra Noer Hamdhan)

Disahkan Oleh
Ketua LP2M,

Iwan Juwana, S.T., M.EM., Ph.D.
NIP: 20010601

LAPORAN KEGIATAN

Tujuan

Tujuan dari kegiatan NGC Plaxis Training Series #2 : Plaxis 2D Training ini adalah untuk memberikan wawasan, pengetahuan, praktik, serta wadah diskusi kepada para peserta baik yang berasal dari akademisi maupun praktisi yang bergerak di bidang geoteknik serta membutuhkan *upgrading* keahlian dan pengetahuan terkait *Deep Excavation and Ground Improvement* melalui perangkat lunak PLAXIS 2D.

Deskripsi Kegiatan

Kegiatan ini dilaksanakan selama 3 hari, yakni pada 21 April – 23 April 2021 selama 4 (empat) jam setiap hari-nya, dari pukul 13.00 – 15.00 WIB. Lokasi pelaksanaan kegiatan ini dilaksanakan melalui pertemuan *online* (tatap maya) via aplikasi Zoom. Jumlah peserta yang mengikuti pelatihan ini yaitu sebanyak 48 peserta yang tercatat pada formulir pendaftaran maupun daftar hadir setiap harinya yang disampaikan melalui *Google form*. Adapun peserta yang mengikuti pelatihan ini berasal dari berbagai institusi, seperti Institut Teknologi Nasional Bandung, Politeknik Negeri Bandung, Institut Teknologi Sumatera, Universitas Lampung, Politeknik Negeri Semarang, dan berbagai konsultan geoteknik (daftar peserta terlampir).

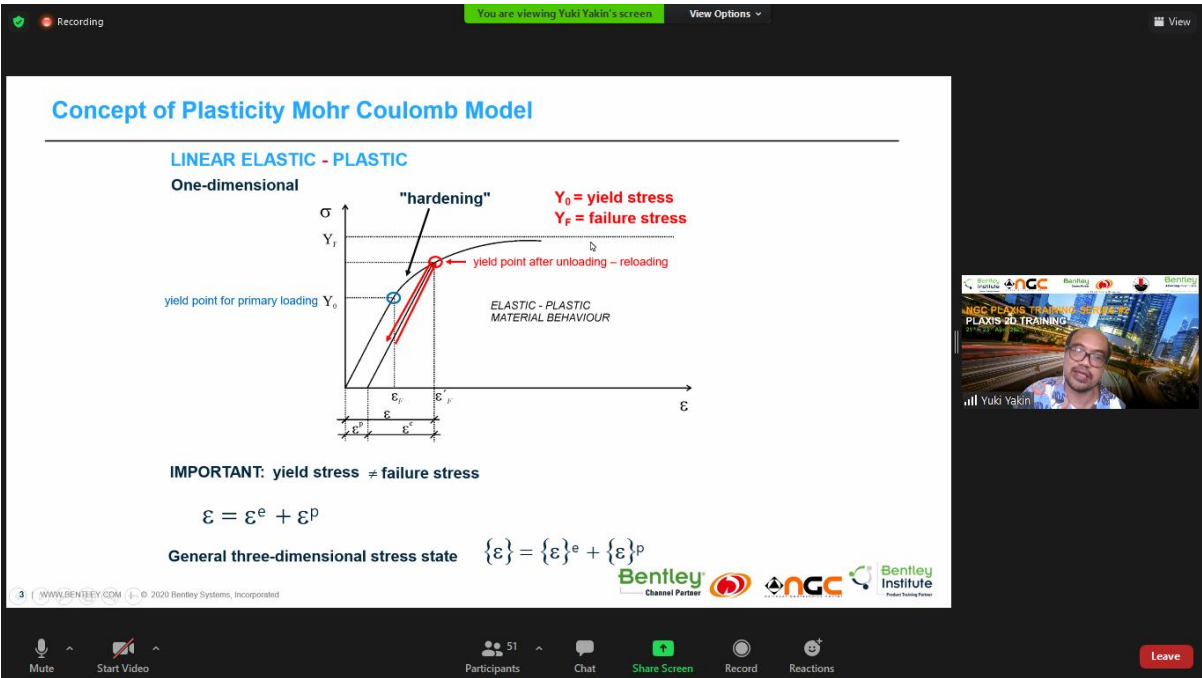
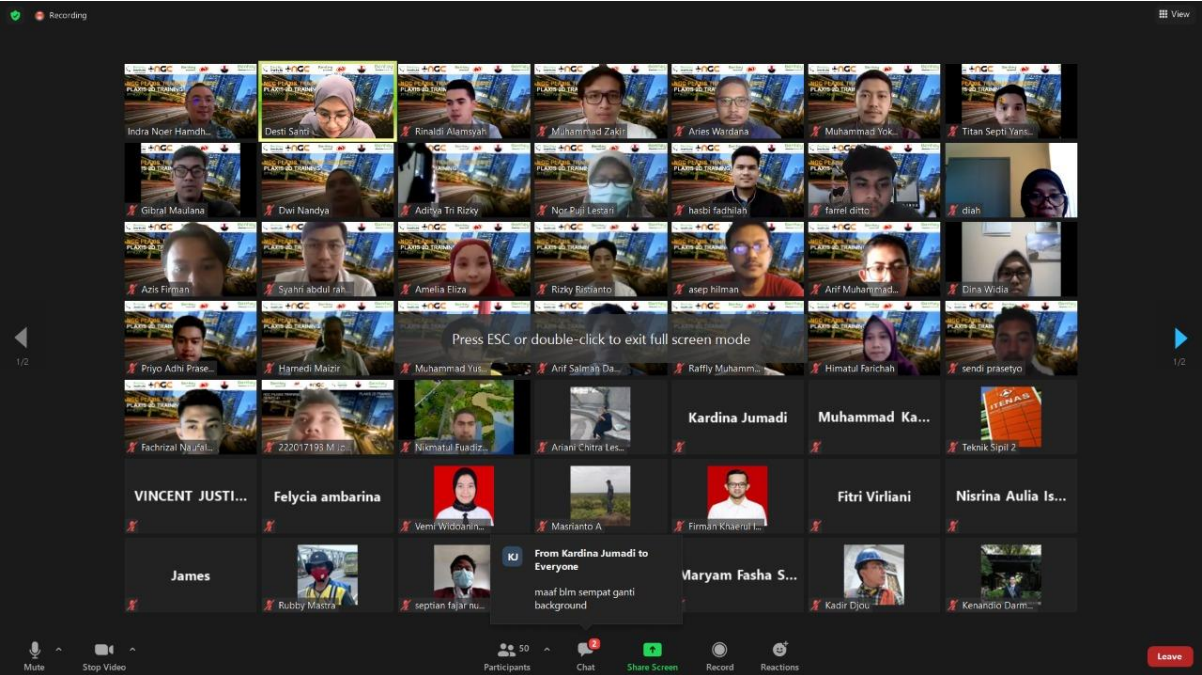
Materi-materi yang disampaikan pada kegiatan pelatihan ini adalah sebagai berikut (jadwal pelaksanaan terlampir):

1. Hari ke-1 Plaxis 2D Training:
 - Introduction to Finite Element Modeling
 - Plasticity Mohr-Coulomb & Hardening Soil Model
 - Structural elements in Plaxis
 - Initial Stresses
 - Calibration of HS model
2. Hari ke-2 Plaxis 2D Training:
 - Modeling of deep excavation
 - Excavation of building pit (MC)
 - Excavation of building pit (HS) with geogrid approach
 - Excavation of building pit (HS) with embedded beam approach
3. Hari ke-3 Plaxis 2D Training:
 - Modeling groundwater
 - Modeling of undrained behaviour and consolidation
 - Modeling of ground improvement
 - Modeling of embankment improved with PVD
 - Modeling of embankment improved with PVD + Vacuum

Para peserta yang mengikuti pelatihan ini mendapatkan Modul Pelatihan dan sertifikat resmi dari *Bentley Institute*.

BUKTI KEGIATAN

Hari Pertama Kegiatan



Zoom Meeting

You are viewing Yuki Yakin's screen

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Concept of Plasticity Mohr Coulomb Model

LINEAR ELASTIC - PLASTIC

One-dimensional

yield point for primary loading Y_0

"hardening"

Y_0 = yield stress
 Y_f = failure stress

yield point after unloading - reloading

ELASTIC - PLASTIC MATERIAL BEHAVIOUR

IMPORTANT: yield stress $\neq$ failure stress

$\epsilon = \epsilon^e + \epsilon^p$

General three-dimensional stress state $\{\epsilon\} = \{\epsilon\}^e + \{\epsilon\}^p$

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Mute

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2:05 PM

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[PDF] Exercise 1 Calibration of HS Model.pdf - Adobe Reader

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Parameter	Unit	Value
E_{38}^{ref}	[kPa]	31,000
E_{min}^{ref}	[kPa]	31,000
E_{ur}^{ref}	[kPa]	90,000
ν_{ur}	[-]	0.2
c'	[kPa]	0
ϕ'	[°]	42
ψ	[°]	16
m	[-]	0.6
K_{σ}^{HS}	[-]	0.33

Table 2: Hardening Soil Parameters of the Sand

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2. Perform the laboratory tests using correct values for the parameters found

3. Match SoilTest results with the original laboratory results to find the best matching model parameters for the Hardening Soil model.

Exercise 1: LABORATORY TESTS ON SAND

Parameter determination

On a sample of dense sand both oedometer tests and triaxial tests have been performed. The results of those tests are given in the figures below. Use these figures to determine the parameters for the Hardening Soil model and collect the parameters in Table 1. Note that it is possible that some parameters cannot be determined with the given laboratory results, these parameters have to be estimated.

Figure 1: Oedometer test results

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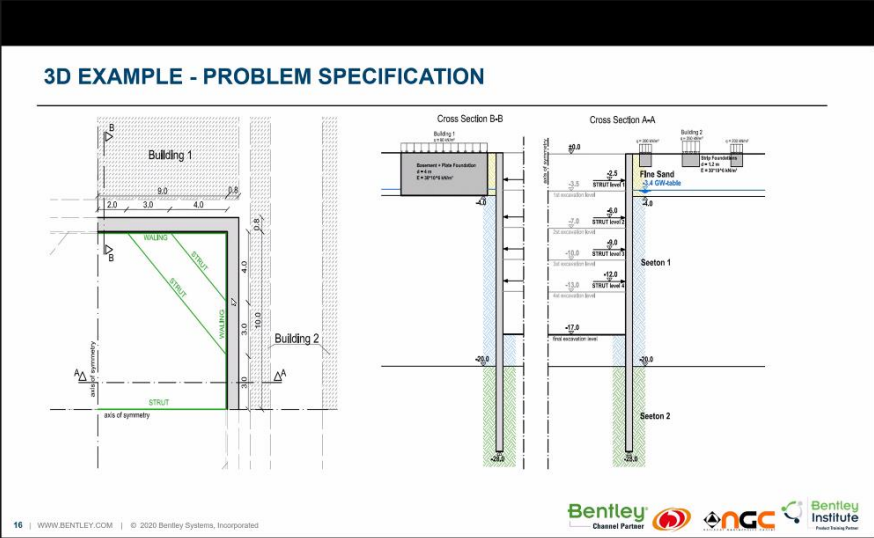
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Hari Kedua Kegiatan

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3D EXAMPLE - PROBLEM SPECIFICATION



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NGC WEBINAR SERIES 13
GEOTECHNICAL ANALYSIS
USING PLAXIS 2D TRAINING



Indra Noer Hamdhan

Zoom Meeting

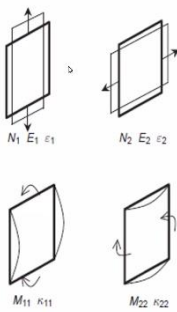
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DIAPHRAGM WALL - MODELLING

- Isotropy
 - Linear elastic material behaviour
- Anisotropy
 - Plate elements
 - Linear elastic material behaviour
 - Continuum elements
 - Jointed Rock Model
 - Assumptions:
 - $\nu_1 = \nu_2 = 0.2$
 - $E_2 = \frac{1}{4}E_1$
 $\Rightarrow EA_2 = \frac{1}{4}EA_1$ (axial stiffness)
 $\Rightarrow EI_2 = \frac{1}{4}EI_1$ (bending stiffness)



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Aditya Tri Rizky

Unmute

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Participants

Chat

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Recording

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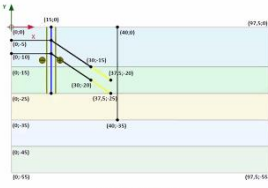


Figure 4: Geometry of the model

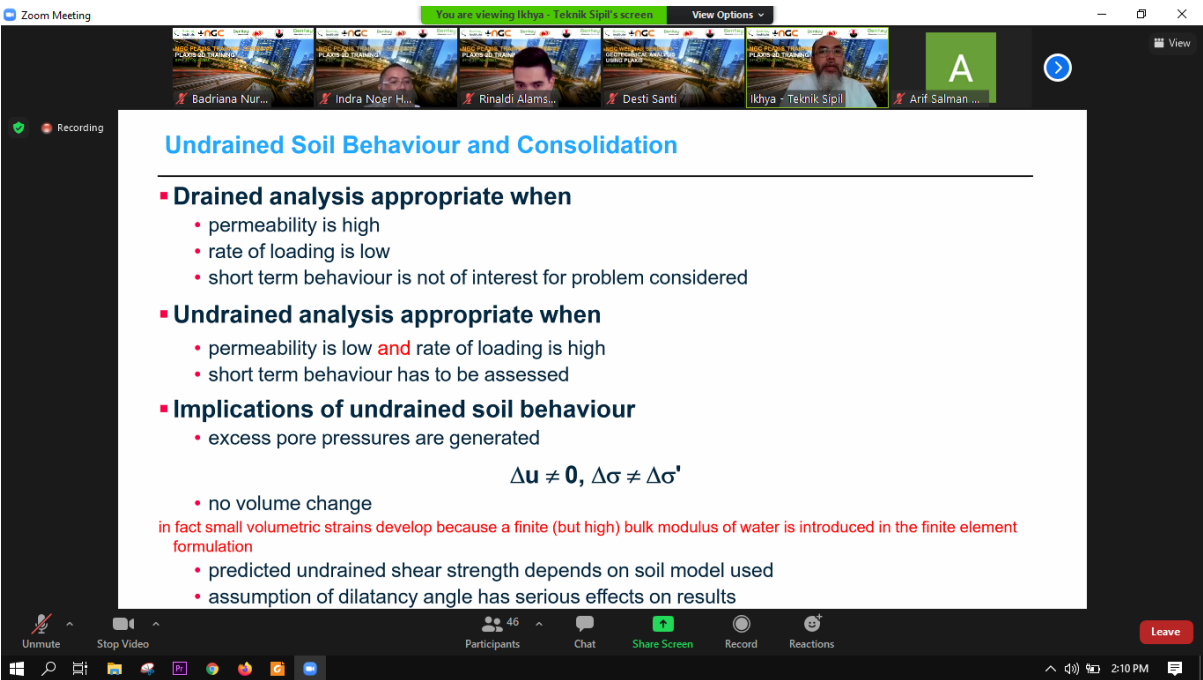
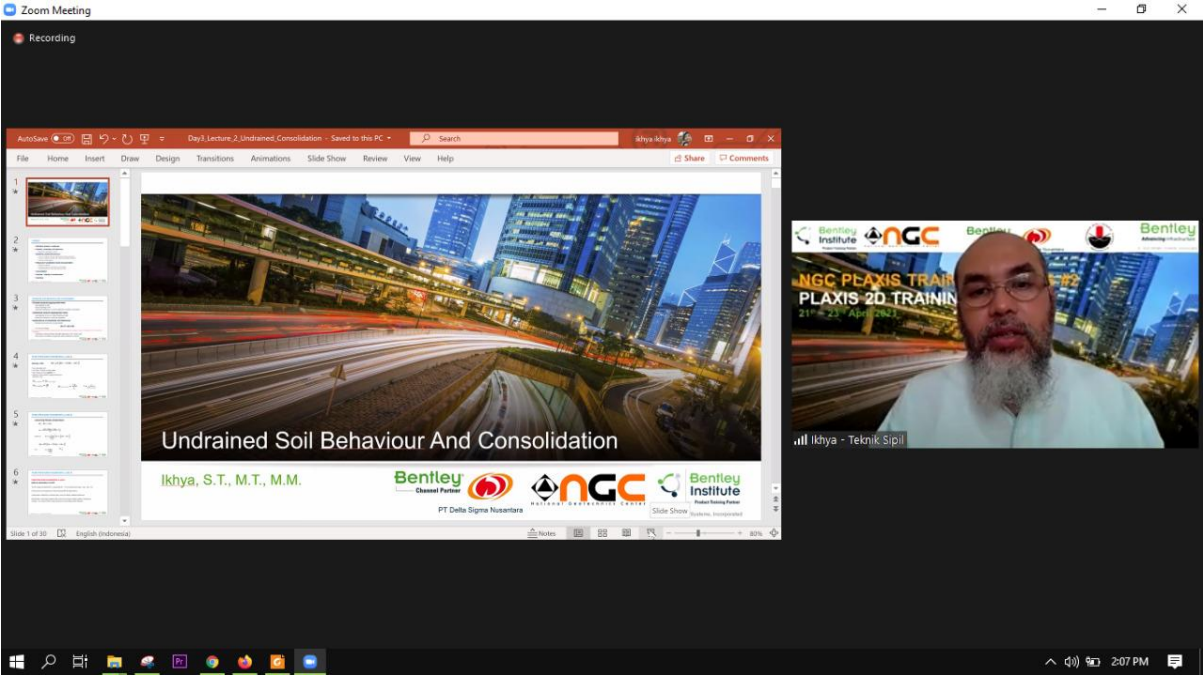
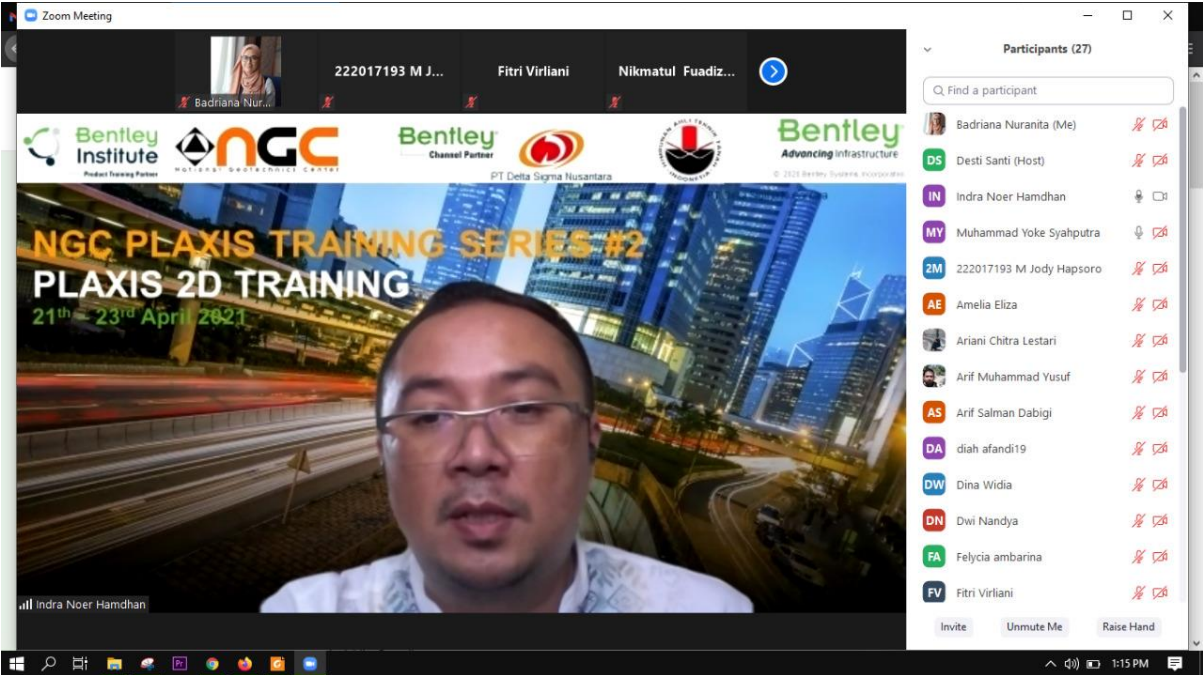
- Click the **Create** button  in the side toolbar and select the **Create Plate**  option to introduce the diaphragm wall.
- Click the **Create structure** button again and select the **Create geometry**  option to introduce the two geotextile elements that represent the great body.
- Right-click the plate representing the diaphragm wall. Next to **Create** and click on the **Positive integer** option in the appearing menu (Figure 5). In the same way, select a **negative integer** as well.

NGC WEBINAR SERIES 13
GEOTECHNICAL ANALYSIS
USING PLAXIS



Desti Santi

Hari Ketiga Kegiatan



Zoom Meeting interface showing a screen share of a PDF document titled "2-Reference-2D.pdf" and a video feed of participants.

The PDF document displays the "INTRODUCTION" section of a consolidation analysis exercise. The exercise concerns the consolidation analysis with vertical drains (with and without drains, with and without smear effect, with and without vacuum). In order to keep the problem as simple as possible, only one soil layer is considered.

Objectives:

- Consolidation analysis
- Modelling drains
- Change of horizontal permeability (k_x)
- Updated mesh analysis (large deformations)
- Introduction Vacuum Consolidation

Figure 1: Scheme of the exercise

The diagram shows a cross-section of a road embankment. The embankment is 20.0 m wide and 4.0 m high. The slopes have an inclination of 1:1.5. The problem is symmetric, so only one half is modelled (in this case the right half is chosen). The embankment itself is composed of sandysoil. The subsoil consists of 12.0 m of soft soil. The phreatic level is located 0 m (at the original ground surface). Under the soft soil layer there is an Impermeable Soil Layer.

INPUT

Figure 1 shows a cross section of a road embankment. The embankment is 20.0 m wide and 4.0 m high. The slopes have an inclination of 1:1.5. The problem is symmetric, so only one half is modelled (in this case the right half is chosen). The embankment itself is composed of sandysoil. The subsoil consists of 12.0 m of soft soil. The phreatic level is located 0 m (at the original ground surface). Under the soft soil layer there is an Impermeable Soil Layer.

General settings

Start the Input program and select Start a new project from the Quick select dialog box. In the Project Metadata of the Project properties window, enter an appropriate title (PVD).

The video feed shows participants: Badriana Nurantia, Rinaldi Alamsyah, and Desti Santi. The Zoom interface includes controls for Unmute, Start Video, Participants (40), Chat, Share Screen, Record, Reactions, and Leave.

Zoom Meeting interface showing a screen share of a PDF document titled "2-Reference-2D.pdf" and a video feed of participants.

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INPUT

Figure 1 shows a cross section of a road embankment. The embankment is 20.0 m wide and 4.0 m high. The slopes have an inclination of 1:1.5. The problem is symmetric, so only one half is modelled (in this case the right half is chosen). The embankment itself is composed of sandysoil. The subsoil consists of 12.0 m of soft soil. The phreatic level is located 0 m (at the original ground surface). Under the soft soil layer there is an Impermeable Soil Layer.

General settings

Start the Input program and select Start a new project from the Quick select dialog box. In the Project Metadata of the Project properties window, enter an appropriate title (PVD).

The video feed shows participants: Rinaldi Alamsyah. The Zoom interface includes controls for Unmute, Start Video, Participants (40), Chat, Share Screen, Record, Reactions, and Leave.

Zoom Meeting interface showing a screen share of a PDF document titled "2-Reference-2D.pdf" and a video feed of participants.

The PDF document displays the "RESULTS" section of a consolidation analysis exercise. The exercise concerns the consolidation analysis with vertical drains (with and without drains, with and without smear effect, with and without vacuum). In order to keep the problem as simple as possible, only one soil layer is considered.

RESULTS

After the calculation has finished, select the "View calculation" button that will start the input program.

Check the various types of output, such as the deformed mesh, displacement contours, excess pore pressure (Poreces), etc. These can be found from the Deformation and Stress menu.

Figure 20: Vertical Displacement (mm)

Figure 20: Excess pore pressure (Poreces) (kPa)

The Curves manager can be used to view the development, with time, of the excess pore pressure under the embankment (Point B) (Figure 20).

In order to create such a curve, follow these steps:

- For the x-axis, select the Project option from the drop-down menu and select Time in the tree.
- For the y-axis, select the Poreces option from the drop-down menu and select Point B in the tree.

The video feed shows participants: Desti Santi. The Zoom interface includes controls for Unmute, Start Video, Participants (40), Chat, Share Screen, Record, Reactions, and Leave.

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CONTOH SERTIFIKAT



**Bentley
Institute**

Certificate of Accomplishment

THIS CERTIFICATE IS PRESENTED TO

Badriana Nuranita

upon successful completion of
Plaxis 2D Training | EN

Product: PLAXIS 2D Version: CONNECT Edition

Course Date: April 21, 2021 - April 23, 2021 Learning Units: 12

Training Partner: NATIONAL GEOTECHNICS CENTER ITENAS



Vinayak Trivedi
Global Head, Bentley Institute
Bentley Systems Inc.

Certificate ID: 1179335129



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JADWAL KEGIATAN
PLAXIS 2D ACADEMIC TRAINING
21th – 23th April 2021

DAY 1

No	Name	Session Time (hh:mm)	Total Time (hh:mm)	Name	Type
1	IM	13:00 - 13:45	0:45	Introduction to Finite Element Modelling	Lecture
2	YK	13:45 - 14:45	1:00	Plasticity Mohr-Coulomb & Hardening soil model	Lecture
3	INH	14:45 - 15:45	0:45	Structural Elements In Plaxis	Lecture
4		15:45 - 16:00	0:15	Istirahat dan Shalat Ashar	
5	INH	16:00 - 16:45	0:15	Initial stresses	Lecture
6	RA & DSP	16:45 - 17:45	1:00	Calibration of HS model	Exercise

DAY 2

No	Name	Session Time (hh:mm)	Total Time (hh:mm)	Name	Type
7	INH	13:00 - 14:00	1:00	Modelling of deep excavation	Lecture
8	RA & DSP	14:00 - 15:00	1:00	Excavation of building pit (MC)	Exercise
9	RA & DSP	15:00 - 16:00	1:00	Excavation of building pit (HS) with geogrid approaches	Exercise
10		16:00 - 16:15	0:15	Istirahat dan Shalat Ashar	
11	RA & DSP	16:15 - 17:15	1:00	Excavation of building pit (HS) with Embedded beam approaches	Exercise

DAY 3

No	Name	Session Time (hh:mm)	Total Time (hh:mm)	Name	Type
13	INH	13:00 - 13:45	0:45	Modelling groundwater	Lecture
14	IK	13:45 - 14:45	1:00	Modelling of Undrained Behaviour and Consolidation	Lecture
15	IK	14:45 - 15:15	0:30	Modelling of ground improvement	Lecture
16		15:15 - 15:30	0:15	Istirahat dan Shalat Ashar	
17	RA & DSP	15:30 - 16:30	1:00	Modelling of Embankment Improved with PVD	Exercise
18	RA & DSP	16:30 - 17:30	1:00	Modelling of Embankment Improved with PVD + Vacuum	Exercise