

**SUMMARY OF SOIL TEST**

TEROWONG NOTOG BANYUMAS												
LAB IKA ADYA PERKASA												
PROJECT												
LOCATION												
TESTED BY												
SAMPLE NO												
DEPTH ( m )	B - 1				B - 2				B - 3			
	6.30 - 7.00	16.00 - 16.80	21.10 - 21.80	16.30 - 17.00	27.20 - 27.80	32.10 - 32.80	16.90 - 17.50	31.00 - 31.80	36.30 - 37.00			
PROPERTIES	Natural Water Content (%)	24.19	27.49	25.66	25.31	23.01	22.89	24.03	27.27			
	Specific gravity of soil $G_s$	-	2.678	2.662	2.665	2.682	2.685	2.672	2.649			
	Wet density $\gamma_{wet}$ (g/cm <sup>3</sup> )	2.010	1.954	1.977	1.920	1.999	2.036	1.976	1.948			
	Dry density $\gamma_d$ (g/cm <sup>3</sup> )	1.618	1.532	1.574	1.532	1.625	1.657	1.593	1.530			
	Void ratio $e$	0.661	0.748	0.692	0.739	0.650	0.620	0.678	0.731			
	Saturated density $\gamma_{sat}$ (g/cm <sup>3</sup> )	2.016	1.960	1.983	1.957	2.019	2.040	1.997	1.953			
	Submerged density $\gamma_{sub}$ (g/cm <sup>3</sup> )	1.016	0.960	0.983	0.957	1.019	1.040	0.997	0.953			
	Degree of Saturation $S_{ro}$ %	98.34	98.46	98.75	91.24	94.95	99.05	94.76	98.86			
	Bulk Dry Basis	2.223	-	-	-	-	-	-	-			
	Saturated Surface Dry Condition	2.396	-	-	-	-	-	-	-			
Apparent	2.689	-	-	-	-	-	-	-				
Absorption	7.79	-	-	-	-	-	-	-				
DIRECT SHEAR	Cohesion C kg/cm <sup>2</sup>	-	-	-	-	-	-	-	-			
	Internal friction angl $\phi$	-	-	-	-	-	-	-	-			
TRIAXIAL UU	Cohesion C kg/cm <sup>2</sup>	3.884	1.691	1.273	2.686	2.204	2.148	2.299	1.992			
	Internal friction angle $\phi$	28 ° 45'	25 ° 49'	25 ° 14'	27 ° 45'	27 ° 20'	27 ° 20'	27 ° 39'	27 ° 17'			
UNIAXIAL COMPRESSIVE STRENGTH	Compressive Strenght $q_u$ kg/cm <sup>2</sup>	76.817	33.759	25.335	53.296	40.305	42.218	45.117	39.136			
	Modulus Axial $E_a$ kg/cm <sup>2</sup>	4.742E+03	1.579E+03	1.240E+03	3.084E+03	2.941E+03	3.199E+03	3.276E+03	2.808E+03			
	Elasticity Diametral $E_d$ kg/cm <sup>2</sup>	1.340E+04	4.889E+03	3.768E+03	1.004E+04	9.713E+03	9.535E+03	9.423E+03	8.317E+03			
	Poisson's Ratio	0.354	0.323	0.329	0.307	0.303	0.336	0.348	0.338			
	Axial Strain %	1.67	2.25	2.03	1.79	1.41	1.39	1.42	1.42			



## SPECIFIC GRAVITY TEST OF SOIL ( ASTM D. 854 - 58 )

PROJECT	TEROWONGAN NOTOG - BANYUMAS	DATE	January 20, 2017		
LOCATION		TESTED BY	GANIB HADI PRAYOGO ( LAB IKA ADYA PERKASA )		
SAMPLE	<b>B - 3</b>	DEPTH	16.90. - 17.50		
Determination No		1	2	3	4
No of Pycnometer		58	I	52	
Weight of Pycnometer	Wf (gr)	50.930	37.010	53.870	
Weight of ( Pycnometer + Water )	Wa (gr)	151.170	136.860	154.280	
Temperature of Calibration ( Corrsponding with Wa )	T' °C	26	26	26	
Weight ( Pycnometer + Soil + Water )	Wb (gr)	164.280	149.860	167.090	
Temperature of Calibration ( Corresponding to Wb )	T °C	27	27	27	
Weight dry soil Wo	No of Container				
	Weight of ( Container + Dry Soil )	(gr)	38.640	38.510	38.160
	Weight of Container	(gr)	17.780	17.780	17.780
	Wo	(gr)	20.860	20.730	20.380
Unit of Water ratio ( T °C / T' °C )			0.99973	0.99973	0.99973
Weight of ( Pycnometer + Water ) Calculation for T° C		(gr)	151.1428	136.8330	154.2528
Wo + ( Wa - Wb )					
Deflocculant correction					
Wo + ( Wa - Wb ) corrected			7.723	7.703	7.543
Specific Gravity Gs ( T oC )		$\frac{Wo}{Wo + ( Wa - Wb )}$	2.701	2.691	2.702
Coefficient for Temperature Correction K			0.9951	0.9951	0.9951
Specific Gravity at 20°C = K x Gs (T° C )			2.688	2.678	2.689
Average Specific Gravity at 20° C					<b>2.685</b>
Remarks					

## SPECIFIC GRAVITY TEST OF SOIL ( ASTM D. 854 - 58 )

PROJECT	<b>TEROWONGAN NOTOG - BANYUMAS</b>			DATE	January 20, 2017
LOCATION				TESTED BY	GANIB HADI PRAYOGO ( LAB IKA ADYA PERKASA )
SAMPLE	<b>B - 3</b>			DEPTH	31.00 - 31.80
Determination No		1	2	3	4
No of Pycnometer		55	54	15	
Weight of Pycnometer	Wf (gr)	51.250	52.280	43.067	
Weight of ( Pycnometer + Water )	Wa (gr)	151.310	153.170	145.929	
Temperature of Calibration ( Corrsponding with Wa )	T' °C	26	26	26	
Weight ( Pycnometer + Soil + Water )	Wb (gr)	164.000	166.350	158.660	
Temperature of Calibration ( Corresponding to Wb )	T °C	27	27	27	
Weight dry soil Wo	No of Container				
	Weight of ( Container + Dry Soil )	(gr)	38.020	38.820	38.140
	Weight of Container	(gr)	17.780	17.780	17.780
	Wo	(gr)	20.240	21.040	20.360
Unit of Water ratio ( T °C / T' °C )		0.99973	0.99973	0.99973	
Weight of ( Pycnometer + Water ) Calculation for T° C	(gr)	151.2829	153.1427	145.9008	
Wo + ( Wa - Wb )					
Deflocculant correction					
Wo + ( Wa - Wb ) corrected		7.523	7.833	7.601	
Specific Gravity Gs ( T oC ) $\frac{Wo}{Wo + ( Wa - Wb )}$		2.690	2.686	2.679	
Coefficient for Temperature Correction K		0.9951	0.9951	0.9951	
Specific Gravity at 20°C = K x Gs (T° C )		2.677	2.673	2.666	
Average Specific Gravity at 20° C					<b>2.672</b>
Remarks					

## SPECIFIC GRAVITY TEST OF SOIL ( ASTM D. 854 - 58 )

PROJECT	TEROWONGAN NOTOG - BANYUMAS		DATE	January 20, 2017	
LOCATION		TESTED BY	GANIB HADI PRAYOGO ( LAB IKA ADYA PERKASA )		
SAMPLE	B - 3		DEPTH	36.30 - 37.00	
Determination No		1	2	3	4
No of Pycnometer		L	95	24	
Weight of Pycnometer	Wf (gr)	34.550	37.700	38.620	
Weight of ( Pycnometer + Water )	Wa (gr)	135.120	146.520	138.770	
Temperature of Calibration ( Corrsponding with Wa )	T' °C	26	26	26	
Weight ( Pycnometer + Soil + Water )	Wb (gr)	147.960	159.600	151.420	
Temperature of Calibration ( Corresponding to Wb )	T °C	27	27	27	
Weight dry soil Wo	No of Container				
	Weight of ( Container + Dry Soil )	(gr)	38.380	38.820	38.060
	Weight of Container	(gr)	17.780	17.780	17.780
	Wo	(gr)	20.600	21.040	20.280
Unit of Water ratio ( T °C / T' °C )			0.99973	0.99973	0.99973
Weight of ( Pycnometer + Water ) Calculation for T° C		(gr)	135.0928	146.4905	138.7429
Wo + ( Wa - Wb )					
Deflocculant correction					
Wo + ( Wa - Wb ) corrected			7.733	7.931	7.603
Specific Gravity Gs ( T oC )		$\frac{Wo}{Wo + ( Wa - Wb)}$	2.664	2.653	2.667
Coefficient for Temperature Correction K			0.9951	0.9951	0.9951
Specific Gravity at 20°C = K x Gs (T° C )			2.651	2.640	2.654
Average Specific Gravity at 20° C					<b>2.649</b>
Remarks					

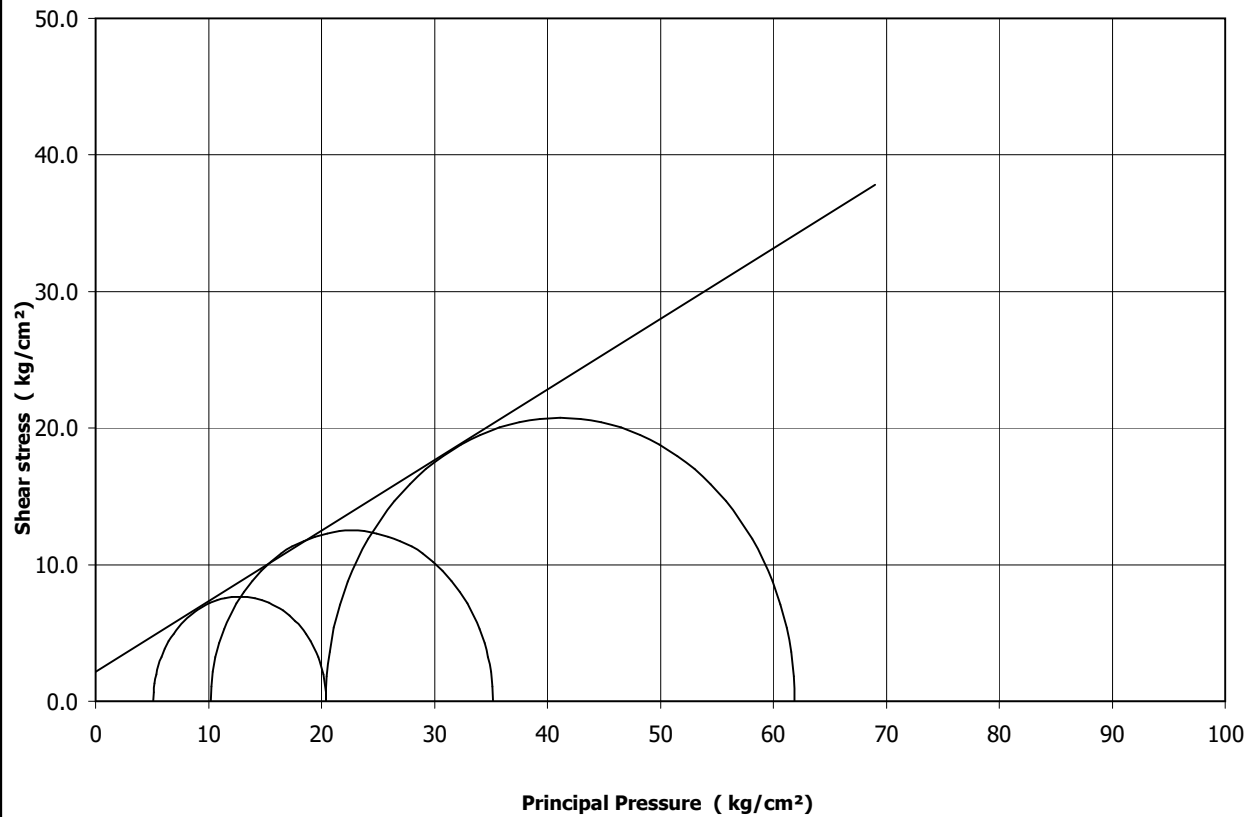


### TRIAXIAL COMPRESSION TEST ( UU ) ( ASTM D.2850 - 87 )

PROJECT	<b>TEROWONGAN NOTOG - BANYUMAS</b>	Date	January 21, 2017
LOCATION		Tested by	REDY ARIYANTO
SAMPLE No.	<b>B - 3</b>	Depth ( m )	16.90 - 17.50
Condition of sample :	<b>ROCK CORE</b>	LAB	IKA ADYA PERKASA

Test piece No.		1	2	3	4	5
Diameter of sample	D cm	5.12	5.12	5.13		
Height of sample	H cm	10.25	10.27	10.31		
Lateral pressure	$\sigma_3$ kg/cm <sup>2</sup>	5.1	10.2	20.4		
Max. Compression Stress	$\sigma_1$ kg/cm <sup>2</sup>	20.416	35.178	61.874		

	Total stress	Effective stress
Cohesion C ( kg/cm <sup>2</sup> )	<b>2.148</b>	
Angle of internal friction $\phi$	<b>27 ° 20 ' 4 "</b>	
Coeff. of internal friction tan $\phi$	<b>0.517</b>	

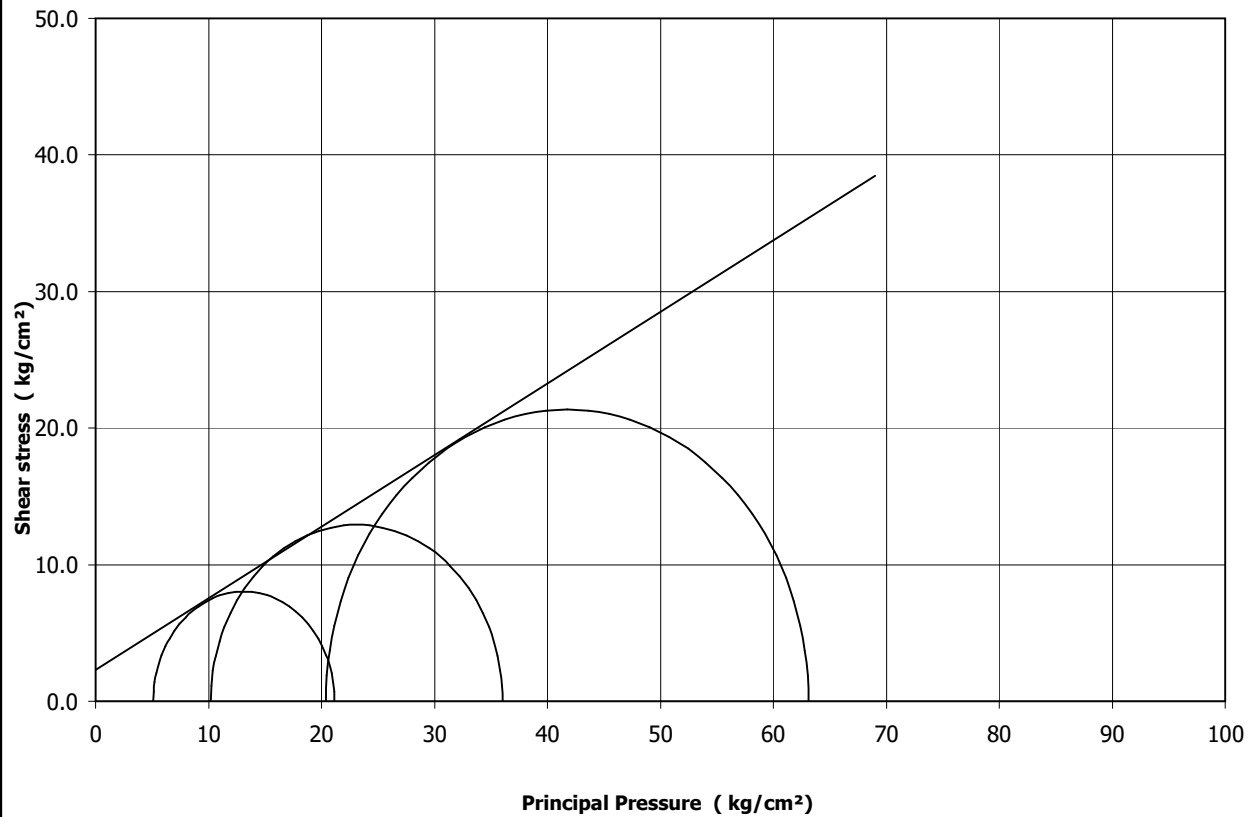


### TRIAxIAL COMPRESSION TEST ( UU ) ( ASTM D.2850 - 87 )

PROJECT	<b>TEROWONGAN NOTOG - BANYUMAS</b>	Date	January 21, 2017
LOCATION		Tested by	REDY ARIYANTO
SAMPLE No.	<b>B - 3</b>	Depth ( m )	31.00 - 31.80
Condition of sample :	<b>ROCK CORE</b>	LAB	IKA ADYA PERKASA

Test piece No.		1	2	3	4	5
Diameter of sample	D cm	5.16	5.16	5.16		
Height of sample	H cm	10.35	10.32	10.36		
Lateral pressure	$\sigma_3$ kg/cm <sup>2</sup>	5.1	10.2	20.4		
Max. Compression Stress	$\sigma_1$ kg/cm <sup>2</sup>	21.158	36.028	63.125		

	Total stress	Effective stress
Cohesion C ( kg/cm <sup>2</sup> )	<b>2.299</b>	
Angle of internal friction $\phi$	<b>27 ° 39 ' 10 "</b>	
Coeff. of internal friction tan $\phi$	<b>0.524</b>	



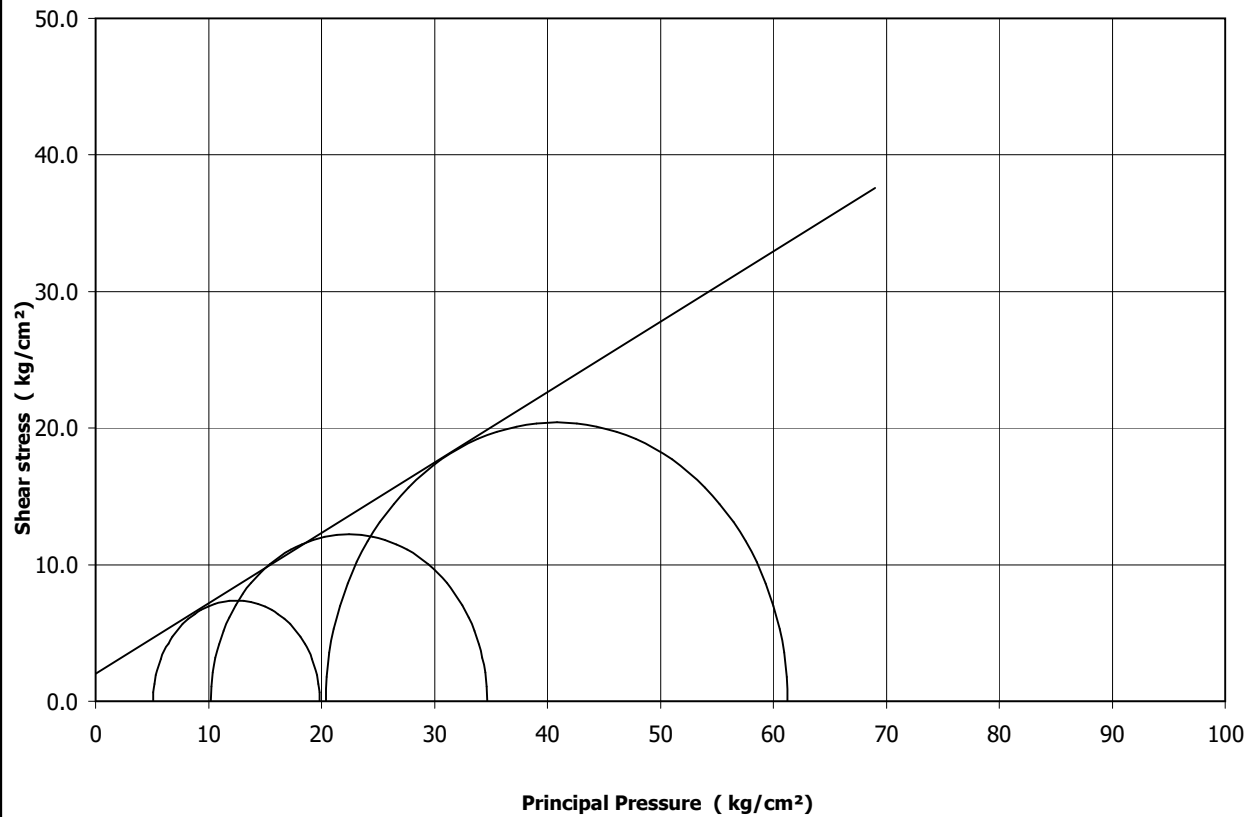


### TRIAxIAL COMPRESSION TEST ( UU ) ( ASTM D.2850 - 87 )

PROJECT	<b>TEROWONGAN NOTOG - BANYUMAS</b>	Date	January 21, 2017
LOCATION		Tested by	REDY ARIYANTO
SAMPLE No.	<b>B - 3</b>	Depth ( m )	36.30 - 37.00
Condition of sample :	<b>ROCK CORE</b>	LAB	IKA ADYA PERKASA

Test piece No.		1	2	3	4	5
Diameter of sample	D cm	5.14	5.14	5.15		
Height of sample	H cm	10.29	10.32	10.34		
Lateral pressure	$\sigma_3$ kg/cm <sup>2</sup>	5.1	10.2	20.4		
Max. Compression Stress	$\sigma_1$ kg/cm <sup>2</sup>	19.842	34.666	61.250		

	Total stress	Effective stress
Cohesion C ( kg/cm <sup>2</sup> )	<b>1.992</b>	
Angle of internal friction $\phi$	<b>27 ° 17 ' 39 "</b>	
Coeff. of internal friction tan $\phi$	<b>0.516</b>	

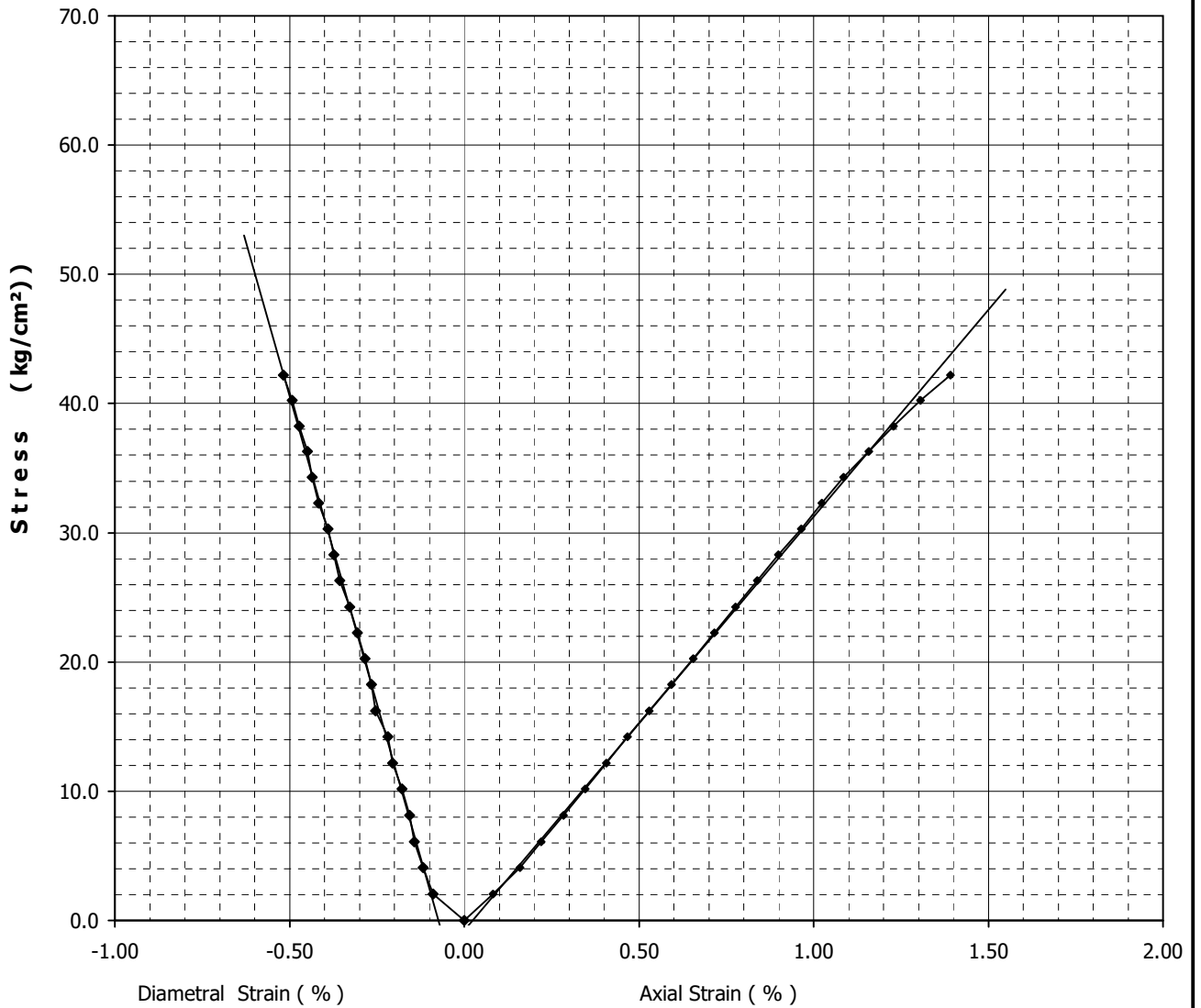


**UNIAXIAL COMPRESSION TEST FOR ELASTIC MODULUS OF ROCK CORE SPECIMEN  
ASTM D 3148 - 93**

PROJECT	<b>TEROWONG NOTOG BANYUMAS</b>	Date of Testing	January 18, 2017
LOCATION		Tested by	LUQMANUL KHAKIM
SAMPLE NO	<b>B - 3</b>	DEPTH ( m )	16.90 - 17.50
CONDITION OF SAMPLE : <b>CORE</b>		LAB	IKA ADYA PERKASA

**Results**

Wet density	Water Content	Dry density	Uniaxial Compressive Strength (qu)	Modulus Elasticity		Poisson's Ratio	Axial Strain	Remarks
				Axial ( Ea )	Diametral ( Ed )			
ton/m <sup>3</sup>	%	ton/m <sup>3</sup>	kg/cm <sup>2</sup>	kg/cm <sup>2</sup>	kg/cm <sup>2</sup>	$\mu$	%	
			<b>42.218</b>	<b>3.199E+03</b>	<b>9.535E+03</b>	<b>0.336</b>	<b>1.39</b>	

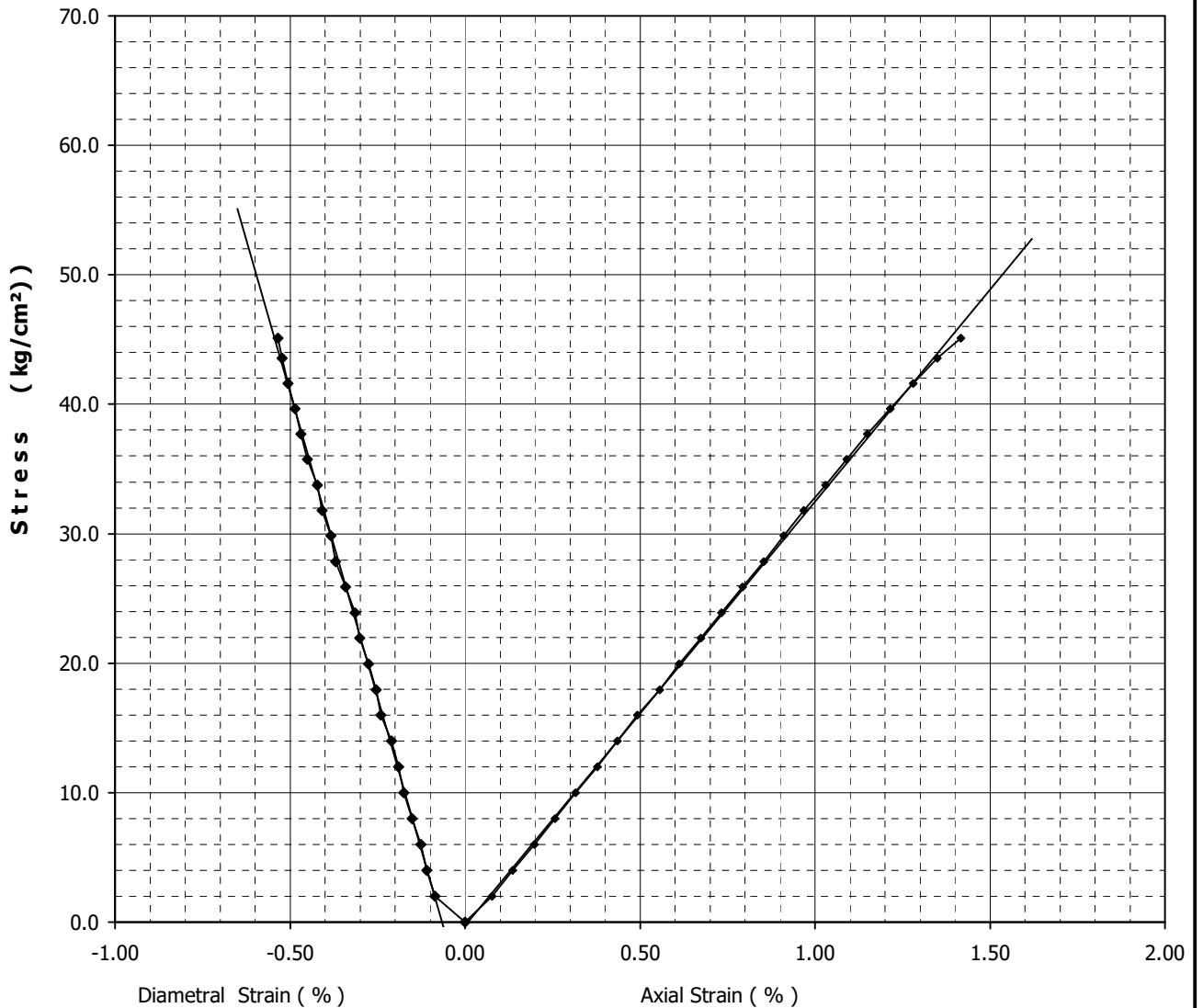


**UNIAXIAL COMPRESSION TEST FOR ELASTIC MODULUS OF ROCK CORE SPECIMEN  
ASTM D 3148 - 93**

PROJECT	<b>TEROWONG NOTOG BANYUMAS</b>	Date of Testing	January 18, 2017
LOCATION		Tested by	LUQMANUL KHAKIM
SAMPLE NO	<b>B - 3</b>	DEPTH ( m )	31.00 - 31.80
CONDITION OF SAMPLE : <b>CORE</b>		LAB	IKA ADYA PERKASA

**Results**

Wet density	Water Content	Dry density	Uniaxial Compressive Strength (qu)	Modulus Elasticity		Poisson's Ratio	Axial Strain	Remarks
				Axial ( Ea )	Diametral ( Ed )			
ton/m <sup>3</sup>	%	ton/m <sup>3</sup>	kg/cm <sup>2</sup>	kg/cm <sup>2</sup>	kg/cm <sup>2</sup>	$\mu$	%	
			<b>45.117</b>	<b>3.276E+03</b>	<b>9.423E+03</b>	<b>0.348</b>	<b>1.42</b>	



**UNIAXIAL COMPRESSION TEST FOR ELASTIC MODULUS OF ROCK CORE SPECIMEN  
ASTM D 3148 - 93**

PROJECT	<b>TEROWONG NOTOG BANYUMAS</b>	Date of Testing	January 18, 2017
LOCATION		Tested by	LUQMANUL KHAKIM
SAMPLE NO	<b>B - 3</b>	DEPTH ( m )	36.30 - 37.00
CONDITION OF SAMPLE : <b>CORE</b>		LAB	IKA ADYA PERKASA

**Results**

Wet density	Water Content	Dry density	Uniaxial Compressive Strength (qu)	Modulus Elasticity		Poisson's Ratio	Axial Strain	Remarks
				Axial ( Ea )	Diametral ( Ed )			
ton/m <sup>3</sup>	%	ton/m <sup>3</sup>	kg/cm <sup>2</sup>	kg/cm <sup>2</sup>	kg/cm <sup>2</sup>	$\mu$	%	
			<b>39.136</b>	<b>2.808E+03</b>	<b>8.317E+03</b>	<b>0.338</b>	<b>1.42</b>	

