

**PREDIKSI KERUSAKAN ABUTMEN JEMBATAN AEK MALAU
DENGAN METODE *ARTIFICIAL NEURAL NETWORK***

SKRIPSI

*Diajukan untuk Memperoleh Gelar Sarjana Teknik pada Program Studi SI Teknik
Sipil Fakultas Teknik Universitas Islam Sumatera Utara*

Oleh

FARINO PYANTO

71200913056



**PROGRAM STUDI TEKNIK SIPIL
FAKULTAS TEKNIK
UNIVERSITAS ISLAM SUMATERA UTARA
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Pembimbing

Pembimbing I

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2023

KATA PENGANTAR

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Penulisan skripsi ini dilakukan dalam rangka memenuhi salah satu syarat mencapai gelar Sarjana Teknik (ST) pada Program Studi Teknik Sipil Fakultas Teknik Universitas Islam Sumatera Utara. Penulis menyadari sepenuhnya bahwa tanpa bantuan dan bimbingan dari para pembimbing serta dari berbagai pihak selama menyelesaikan tulisan ini, maka skripsi ini tidak akan mungkin dapat penulis selesaikan dengan baik.

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DAFTAR ISTILAH

MAPE	=	<i>Mean Absolute Percentage Error</i>
MSE	=	<i>Mean Square Error</i>
LS	=	<i>Limited Safety</i>
IO	=	<i>Immediate Occupancy</i>
CP	=	Collapse Prevention
S_s	=	percepatan batuan dasar batuan pada periode pendek
S_1	=	percepatan batuan dasar pada periode 1 detik
F_a	=	percepatan pada getaran periode pendek
F_v	=	percepatan yang mewakili getaran periode 1 detik

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LAMPIRAN 1 Hasil Analisis Pushover

No	Period	Displacement	Force	Max. Drift	Ket.	Skor
1	0.01233	0.945	-137357.35	0.184210526	Structural Stability	4
2	0.01233	0.945	126240.08	0.184210526	Structural Stability	4
3	0.01233	0.945	106926.18	0.184210526	Structural Stability	4
4	0.01233	0.945	-156671.25	0.184210526	Structural Stability	4
5	0.011055	9.856E-19	-92540.13	1.92125E-19	Immediate Ocupancy	2
6	0.011055	9.856E-19	65990.49	1.92125E-19	Immediate Ocupancy	2
7	0.011055	9.856E-19	-724.35	1.92125E-19	Immediate Ocupancy	2
8	0.011055	9.856E-19	-159254.97	1.92125E-19	Immediate Ocupancy	2
9	0.007999	0.037	-120681.41	0.007212476	Immediate Ocupancy	2
10	0.007999	0.037	-23077.03	0.007212476	Immediate Ocupancy	2
11	0.007999	0.037	7070.43	0.007212476	Immediate Ocupancy	2
12	0.007999	0.037	-90533.95	0.007212476	Immediate Ocupancy	2
13	0.004003	4.572E-17	-74715.36	8.91228E-18	Immediate Ocupancy	2
14	0.004003	4.572E-17	-1914.63	8.91228E-18	Immediate Ocupancy	2
15	0.004003	4.572E-17	-12553.82	8.91228E-18	Immediate Ocupancy	2
16	0.004003	4.572E-17	-85354.55	8.91228E-18	Immediate Ocupancy	2
17	0.003205	4.185E-19	-87625.57	8.15789E-20	Immediate Ocupancy	2
18	0.003205	4.185E-19	-11297.17	8.15789E-20	Immediate Ocupancy	2
19	0.003205	4.185E-19	-1060.54	8.15789E-20	Immediate Ocupancy	2
20	0.003205	4.185E-19	-77388.94	8.15789E-20	Immediate Ocupancy	2
21	0.002959	0.012	-97891.69	0.002339181	Immediate Ocupancy	2
22	0.002959	0.012	10465.72	0.002339181	Immediate	2

No	Period	Displacement	Force	Max. Drift	Ket.	Skor
					Ocupancy	
23	0.002959	0.012	2895.18	0.002339181	Immediate Ocupancy	2
24	0.002959	0.012	-105462.24	0.002339181	Immediate Ocupancy	2
25	0.002376	0.0006126	-146714.67	0.000119415	Immediate Ocupancy	2
26	0.002376	0.0006126	29001.58	0.000119415	Immediate Ocupancy	2
27	0.002376	0.0006126	62830.19	0.000119415	Immediate Ocupancy	2
28	0.002376	0.0006126	-112886.06	0.000119415	Immediate Ocupancy	2
29	0.00234	2.897E-17	-173257.59	5.64717E-18	Immediate Ocupancy	2
30	0.00234	2.897E-17	95950.86	5.64717E-18	Immediate Ocupancy	2
31	0.00234	2.897E-17	439678.35	5.64717E-18	Immediate Ocupancy	2
32	0.00234	2.897E-17	170469.9	5.64717E-18	Immediate Ocupancy	2
33	0.002255	0.001426	301206.38	0.000277973	Immediate Ocupancy	2
34	0.002255	0.001426	255582.71	0.000277973	Immediate Ocupancy	2
35	0.002255	0.001426	-86466.34	0.000277973	Immediate Ocupancy	2
36	0.002255	0.001426	-40842.67	0.000277973	Immediate Ocupancy	2
37	0.002131	1.108E-14	-81778.35	2.15984E-15	Immediate Ocupancy	2
38	0.002131	1.108E-14	-67226.94	2.15984E-15	Immediate Ocupancy	2
39	0.002131	1.108E-14	-75572.88	2.15984E-15	Immediate Ocupancy	2
40	0.002131	1.108E-14	-90124.3	2.15984E-15	Immediate Ocupancy	2
41	0.001962	1.018E-15	-112476.97	1.98441E-16	Immediate Ocupancy	2
42	0.001962	1.018E-15	-75207.09	1.98441E-16	Immediate Ocupancy	2
43	0.001962	1.018E-15	-87149.81	1.98441E-16	Immediate Ocupancy	2
44	0.001962	1.018E-15	-124419.7	1.98441E-16	Immediate	2

No	Period	Displacement	Force	Max. Drift	Ket.	Skor
					Ocupancy	
45	0.001924	0.0002638	-133404.75	5.1423E-05	Immediate Ocupancy	2
46	0.001924	0.0002638	-88769.59	5.1423E-05	Immediate Ocupancy	2
47	0.001924	0.0002638	-71307.41	5.1423E-05	Immediate Ocupancy	2
48	0.001924	0.0002638	-115942.57	5.1423E-05	Immediate Ocupancy	2
49	0.01233	0.945	-95178.54	0.184210526	Structural Stability	4
50	0.01233	0.945	128611.17	0.184210526	Structural Stability	4
51	0.01233	0.945	91570.49	0.184210526	Structural Stability	4
52	0.01233	0.945	-132219.22	0.184210526	Structural Stability	4
53	0.011055	9.856E-19	-78064.9	1.92125E-19	Immediate Ocupancy	2
54	0.011055	9.856E-19	57521.9	1.92125E-19	Immediate Ocupancy	2
55	0.011055	9.856E-19	488.49	1.92125E-19	Immediate Ocupancy	2
56	0.011055	9.856E-19	-135098.3	1.92125E-19	Immediate Ocupancy	2
57	0.007999	0.037	-102112.26	0.007212476	Immediate Ocupancy	2
58	0.007999	0.037	-18662.03	0.007212476	Immediate Ocupancy	2
59	0.007999	0.037	6994.89	0.007212476	Immediate Ocupancy	2
60	0.007999	0.037	-76455.34	0.007212476	Immediate Ocupancy	2
61	0.004003	4.572E-17	-62595.04	8.91228E-18	Immediate Ocupancy	2
62	0.004003	4.572E-17	-748.96	8.91228E-18	Immediate Ocupancy	2
63	0.004003	4.572E-17	-10764.84	8.91228E-18	Immediate Ocupancy	2
64	0.004003	4.572E-17	-72610.92	8.91228E-18	Immediate Ocupancy	2
65	0.003205	4.185E-19	-74017.62	8.15789E-20	Immediate Ocupancy	2
66	0.003205	4.185E-19	-9804.64	8.15789E-20	Immediate	2

No	Period	Displacement	Force	Max. Drift	Ket.	Skor
					Ocupancy	
67	0.003205	4.185E-19	-744.34	8.15789E-20	Immediate Ocupancy	2
68	0.003205	4.185E-19	-64957.32	8.15789E-20	Immediate Ocupancy	2
69	0.002959	0.012	-81719.69	0.002339181	Immediate Ocupancy	2
70	0.002959	0.012	8864.55	0.002339181	Immediate Ocupancy	2
71	0.002959	0.012	1444.21	0.002339181	Immediate Ocupancy	2
72	0.002959	0.012	-89140.03	0.002339181	Immediate Ocupancy	2
73	0.002376	0.0006126	-123433.06	0.000119415	Immediate Ocupancy	2
74	0.002376	0.0006126	23338.96	0.000119415	Immediate Ocupancy	2
75	0.002376	0.0006126	52211.45	0.000119415	Immediate Ocupancy	2
76	0.002376	0.0006126	-94560.57	0.000119415	Immediate Ocupancy	2
77	0.00234	2.897E-17	-145044.6	5.64717E-18	Immediate Ocupancy	2
78	0.00234	2.897E-17	80138	5.64717E-18	Immediate Ocupancy	2
79	0.00234	2.897E-17	361662.55	5.64717E-18	Immediate Ocupancy	2
80	0.00234	2.897E-17	136479.95	5.64717E-18	Immediate Ocupancy	2
81	0.002255	0.001426	262108.17	0.000277973	Immediate Ocupancy	2
82	0.002255	0.001426	223158.76	0.000277973	Immediate Ocupancy	2
83	0.002255	0.001426	-66598.47	0.000277973	Immediate Ocupancy	2
84	0.002255	0.001426	-27649.06	0.000277973	Immediate Ocupancy	2
85	0.002131	1.108E-14	-61697.66	2.15984E-15	Immediate Ocupancy	2
86	0.002131	1.108E-14	-50366.54	2.15984E-15	Immediate Ocupancy	2
87	0.002131	1.108E-14	-61507.03	2.15984E-15	Immediate Ocupancy	2
88	0.002131	1.108E-14	-72838.15	2.15984E-15	Immediate	2

No	Period	Displacement	Force	Max. Drift	Ket.	Skor
					Ocupancy	
89	0.001962	1.018E-15	-91988.67	1.98441E-16	Immediate Ocupancy	2
90	0.001962	1.018E-15	-60924.26	1.98441E-16	Immediate Ocupancy	2
91	0.001962	1.018E-15	-72839.13	1.98441E-16	Immediate Ocupancy	2
92	0.001962	1.018E-15	-103903.53	1.98441E-16	Immediate Ocupancy	2
93	0.001924	0.0002638	-111647.39	5.1423E-05	Immediate Ocupancy	2
94	0.001924	0.0002638	-74275.19	5.1423E-05	Immediate Ocupancy	2
95	0.001924	0.0002638	-59389.02	5.1423E-05	Immediate Ocupancy	2
96	0.001924	0.0002638	-96761.22	5.1423E-05	Immediate Ocupancy	2
97	0.01233	0.945	-93880.15	0.184210526	Structural Stability	4
98	0.01233	0.945	128375.74	0.184210526	Structural Stability	4
99	0.01233	0.945	90968.33	0.184210526	Structural Stability	4
100	0.01233	0.945	-131287.56	0.184210526	Structural Stability	4
101	0.011055	9.856E-19	-77511.94	1.92125E-19	Immediate Ocupancy	2
102	0.011055	9.856E-19	57175.08	1.92125E-19	Immediate Ocupancy	2
103	0.011055	9.856E-19	521.04	1.92125E-19	Immediate Ocupancy	2
104	0.011055	9.856E-19	-134165.98	1.92125E-19	Immediate Ocupancy	2
105	0.007999	0.037	-101396.62	0.007212476	Immediate Ocupancy	2
106	0.007999	0.037	-18502.67	0.007212476	Immediate Ocupancy	2
107	0.007999	0.037	6977.77	0.007212476	Immediate Ocupancy	2
108	0.007999	0.037	-75916.18	0.007212476	Immediate Ocupancy	2
109	0.004003	4.572E-17	-62134.83	8.91228E-18	Immediate Ocupancy	2
110	0.004003	4.572E-17	-715.63	8.91228E-18	Immediate	2

No	Period	Displacement	Force	Max. Drift	Ket.	Skor
					Ocupancy	
111	0.004003	4.572E-17	-10693.72	8.91228E-18	Immediate Ocupancy	2
112	0.004003	4.572E-17	-72112.92	8.91228E-18	Immediate Ocupancy	2
113	0.003205	4.185E-19	-73489.95	8.15789E-20	Immediate Ocupancy	2
114	0.003205	4.185E-19	-9743	8.15789E-20	Immediate Ocupancy	2
115	0.003205	4.185E-19	-735.12	8.15789E-20	Immediate Ocupancy	2
116	0.003205	4.185E-19	-64482.07	8.15789E-20	Immediate Ocupancy	2
117	0.002959	0.012	-81104.03	0.002339181	Immediate Ocupancy	2
118	0.002959	0.012	8801.81	0.002339181	Immediate Ocupancy	2
119	0.002959	0.012	1401.53	0.002339181	Immediate Ocupancy	2
120	0.002959	0.012	-88504.31	0.002339181	Immediate Ocupancy	2
121	0.002376	0.0006126	-122531.53	0.000119415	Immediate Ocupancy	2
122	0.002376	0.0006126	23135.31	0.000119415	Immediate Ocupancy	2
123	0.002376	0.0006126	51807.49	0.000119415	Immediate Ocupancy	2
124	0.002376	0.0006126	-93859.36	0.000119415	Immediate Ocupancy	2
125	0.00234	2.897E-17	-143962.11	5.64717E-18	Immediate Ocupancy	2
126	0.00234	2.897E-17	79530.76	5.64717E-18	Immediate Ocupancy	2
127	0.00234	2.897E-17	358804.63	5.64717E-18	Immediate Ocupancy	2
128	0.00234	2.897E-17	135311.77	5.64717E-18	Immediate Ocupancy	2
129	0.002255	0.001426	260517.24	0.000277973	Immediate Ocupancy	2
130	0.002255	0.001426	221827.24	0.000277973	Immediate Ocupancy	2
131	0.002255	0.001426	-65927.15	0.000277973	Immediate Ocupancy	2
132	0.002255	0.001426	-27237.16	0.000277973	Immediate	2

No	Period	Displacement	Force	Max. Drift	Ket.	Skor
					Ocupancy	
133	0.002131	1.108E-14	-61030.41	2.15984E-15	Immediate Ocupancy	2
134	0.002131	1.108E-14	-49809.54	2.15984E-15	Immediate Ocupancy	2
135	0.002131	1.108E-14	-60996.31	2.15984E-15	Immediate Ocupancy	2
136	0.002131	1.108E-14	-72217.18	2.15984E-15	Immediate Ocupancy	2
137	0.001962	1.018E-15	-91240.88	1.98441E-16	Immediate Ocupancy	2
138	0.001962	1.018E-15	-60409.36	1.98441E-16	Immediate Ocupancy	2
139	0.001962	1.018E-15	-72297.17	1.98441E-16	Immediate Ocupancy	2
140	0.001962	1.018E-15	-103128.69	1.98441E-16	Immediate Ocupancy	2
141	0.001924	0.0002638	-110822.09	5.1423E-05	Immediate Ocupancy	2
142	0.001924	0.0002638	-73725.75	5.1423E-05	Immediate Ocupancy	2
143	0.001924	0.0002638	-58940.23	5.1423E-05	Immediate Ocupancy	2
144	0.001924	0.0002638	-96036.58	5.1423E-05	Immediate Ocupancy	2
145	0.01233	0.945	-93880.15	0.184210526	Structural Stability	4
146	0.01233	0.945	128375.74	0.184210526	Structural Stability	4
147	0.01233	0.945	90968.33	0.184210526	Structural Stability	4
148	0.01233	0.945	-131287.56	0.184210526	Structural Stability	4
149	0.011055	9.856E-19	-77511.94	1.92125E-19	Immediate Ocupancy	2
150	0.011055	9.856E-19	57175.08	1.92125E-19	Immediate Ocupancy	2
151	0.011055	9.856E-19	521.04	1.92125E-19	Immediate Ocupancy	2
152	0.011055	9.856E-19	-134165.98	1.92125E-19	Immediate Ocupancy	2
153	0.007999	0.037	-101396.62	0.007212476	Immediate Ocupancy	2
154	0.007999	0.037	-18502.67	0.007212476	Immediate	2

No	Period	Displacement	Force	Max. Drift	Ket.	Skor
					Ocupancy	
155	0.007999	0.037	6977.77	0.007212476	Immediate Ocupancy	2
156	0.007999	0.037	-75916.18	0.007212476	Immediate Ocupancy	2
157	0.004003	4.572E-17	-62134.83	8.91228E-18	Immediate Ocupancy	2
158	0.004003	4.572E-17	-715.63	8.91228E-18	Immediate Ocupancy	2
159	0.004003	4.572E-17	-10693.72	8.91228E-18	Immediate Ocupancy	2
160	0.004003	4.572E-17	-72112.92	8.91228E-18	Immediate Ocupancy	2
161	0.003205	4.185E-19	-73489.95	8.15789E-20	Immediate Ocupancy	2
162	0.003205	4.185E-19	-9743	8.15789E-20	Immediate Ocupancy	2
163	0.003205	4.185E-19	-735.12	8.15789E-20	Immediate Ocupancy	2
164	0.003205	4.185E-19	-64482.07	8.15789E-20	Immediate Ocupancy	2
165	0.002959	0.012	-81104.03	0.002339181	Immediate Ocupancy	2
166	0.002959	0.012	8801.81	0.002339181	Immediate Ocupancy	2
167	0.002959	0.012	1401.53	0.002339181	Immediate Ocupancy	2
168	0.002959	0.012	-88504.31	0.002339181	Immediate Ocupancy	2
169	0.002376	0.0006126	-122531.53	0.000119415	Immediate Ocupancy	2
170	0.002376	0.0006126	23135.31	0.000119415	Immediate Ocupancy	2
171	0.002376	0.0006126	51807.49	0.000119415	Immediate Ocupancy	2
172	0.002376	0.0006126	-93859.36	0.000119415	Immediate Ocupancy	2
173	0.00234	2.897E-17	-143962.11	5.64717E-18	Immediate Ocupancy	2
174	0.00234	2.897E-17	79530.76	5.64717E-18	Immediate Ocupancy	2
175	0.00234	2.897E-17	358804.63	5.64717E-18	Immediate Ocupancy	2
176	0.00234	2.897E-17	135311.77	5.64717E-18	Immediate	2

No	Period	Displacement	Force	Max. Drift	Ket.	Skor
					Ocupancy	
177	0.002255	0.001426	260517.24	0.000277973	Immediate Ocupancy	2
178	0.002255	0.001426	221827.24	0.000277973	Immediate Ocupancy	2
179	0.002255	0.001426	-65927.15	0.000277973	Immediate Ocupancy	2
180	0.002255	0.001426	-27237.16	0.000277973	Immediate Ocupancy	2
181	0.002131	1.108E-14	-61030.41	2.15984E-15	Immediate Ocupancy	2
182	0.002131	1.108E-14	-49809.54	2.15984E-15	Immediate Ocupancy	2
183	0.002131	1.108E-14	-60996.31	2.15984E-15	Immediate Ocupancy	2
184	0.002131	1.108E-14	-72217.18	2.15984E-15	Immediate Ocupancy	2
185	0.001962	1.018E-15	-91240.88	1.98441E-16	Immediate Ocupancy	2
186	0.001962	1.018E-15	-60409.36	1.98441E-16	Immediate Ocupancy	2
187	0.001962	1.018E-15	-72297.17	1.98441E-16	Immediate Ocupancy	2
188	0.001962	1.018E-15	-103128.69	1.98441E-16	Immediate Ocupancy	2
189	0.001924	0.0002638	-110822.09	5.1423E-05	Immediate Ocupancy	2
190	0.001924	0.0002638	-73725.75	5.1423E-05	Immediate Ocupancy	2
191	0.001924	0.0002638	-58940.23	5.1423E-05	Immediate Ocupancy	2
192	0.001924	0.0002638	-96036.58	5.1423E-05	Immediate Ocupancy	2

LAMPIRAN 2 Perbandingan Data train dan Permodelan Percobaan 1

No.	Y	Y'	Keterangan
1	4	4.000001	Structural Stability
2	4	4.000001	Structural Stability
3	4	3.999995	Structural Stability
4	4	3.999988	Structural Stability
5	2	2.000017	Immediate Ocupancy
6	2	2.00002	Immediate Ocupancy
7	2	2.000015	Immediate Ocupancy
8	2	2.000008	Immediate Ocupancy
9	2	1.999809	Immediate Ocupancy
10	2	1.999991	Immediate Ocupancy
11	2	2	Immediate Ocupancy
12	2	1.999998	Immediate Ocupancy
13	2	2.000001	Immediate Ocupancy
14	2	2.000003	Immediate Ocupancy
15	2	1.999993	Immediate Ocupancy
16	2	2.000006	Immediate Ocupancy
17	2	2.000004	Immediate Ocupancy
18	2	1.999999	Immediate Ocupancy
19	2	2.000001	Immediate Ocupancy
20	2	2.000003	Immediate Ocupancy
21	2	1.999995	Immediate Ocupancy
22	2	2.000003	Immediate Ocupancy
23	2	2.000001	Immediate Ocupancy

No.	Y	Y'	Keterangan
24	2	1.999994	Immediate Ocupancy
25	2	2	Immediate Ocupancy
26	2	1.999994	Immediate Ocupancy
27	2	1.999993	Immediate Ocupancy
28	2	1.999999	Immediate Ocupancy
29	2	2	Immediate Ocupancy
30	2	2.000002	Immediate Ocupancy
31	2	2	Immediate Ocupancy
32	2	1.999993	Immediate Ocupancy
33	2	1.999999	Immediate Ocupancy
34	2	2.000002	Immediate Ocupancy
35	2	1.999998	Immediate Ocupancy
36	2	1.999998	Immediate Ocupancy
37	2	2	Immediate Ocupancy
38	2	2.000001	Immediate Ocupancy
39	2	2.000001	Immediate Ocupancy
40	2	2	Immediate Ocupancy
41	2	2	Immediate Ocupancy
42	2	2.000002	Immediate Ocupancy
43	2	2.000001	Immediate Ocupancy
44	2	1.999999	Immediate Ocupancy
45	2	1.999999	Immediate Ocupancy
46	2	2.000001	Immediate Ocupancy
47	2	2.000003	Immediate Ocupancy

No.	Y	Y'	Keterangan
48	2	1.999999	Immediate Ocupancy
49	4	3.999985	Structural Stability
50	4	3.999992	Structural Stability
51	4	3.999994	Structural Stability
52	4	3.999983	Structural Stability
53	2	2.000006	Immediate Ocupancy
54	2	2.000017	Immediate Ocupancy
55	2	2.000016	Immediate Ocupancy
56	2	2.000007	Immediate Ocupancy
57	2	1.999963	Immediate Ocupancy
58	2	1.999999	Immediate Ocupancy
59	2	2	Immediate Ocupancy
60	2	2.000002	Immediate Ocupancy
61	2	1.999995	Immediate Ocupancy
62	2	2.000004	Immediate Ocupancy
63	2	1.999994	Immediate Ocupancy
64	2	2	Immediate Ocupancy
65	2	2.000003	Immediate Ocupancy
66	2	2	Immediate Ocupancy
67	2	2.000001	Immediate Ocupancy
68	2	2.000002	Immediate Ocupancy
69	2	1.999996	Immediate Ocupancy
70	2	2.000002	Immediate Ocupancy
71	2	2	Immediate Ocupancy

No.	Y	Y'	Keterangan
72	2	1.999995	Immediate Ocupancy
73	2	1.999999	Immediate Ocupancy
74	2	1.999995	Immediate Ocupancy
75	2	1.999993	Immediate Ocupancy
76	2	1.999999	Immediate Ocupancy
77	2	2	Immediate Ocupancy
78	2	2	Immediate Ocupancy
79	2	1.998404	Immediate Ocupancy
80	2	2.000004	Immediate Ocupancy
81	2	1.999999	Immediate Ocupancy
82	2	2.000001	Immediate Ocupancy
83	2	1.999998	Immediate Ocupancy
84	2	1.999998	Immediate Ocupancy
85	2	2.000001	Immediate Ocupancy
86	2	2.000002	Immediate Ocupancy
87	2	2.000001	Immediate Ocupancy
88	2	2.000001	Immediate Ocupancy
89	2	2.000001	Immediate Ocupancy
90	2	2.000004	Immediate Ocupancy
91	2	2.000003	Immediate Ocupancy
92	2	2	Immediate Ocupancy
93	2	1.999999	Immediate Ocupancy
94	2	2.000002	Immediate Ocupancy
95	2	2.000005	Immediate Ocupancy

No.	Y	Y'	Keterangan
96	2	2	Immediate Ocupancy
97	4	3.999992	Structural Stability
98	4	3.999993	Structural Stability
99	4	3.999996	Structural Stability
100	4	3.99998	Structural Stability
101	2	2.000006	Immediate Ocupancy
102	2	2.000017	Immediate Ocupancy
103	2	2.000016	Immediate Ocupancy
104	2	2.000008	Immediate Ocupancy
105	2	1.999966	Immediate Ocupancy
106	2	1.999999	Immediate Ocupancy
107	2	2	Immediate Ocupancy
108	2	2.000002	Immediate Ocupancy
109	2	1.999995	Immediate Ocupancy
110	2	2.000004	Immediate Ocupancy
111	2	1.999994	Immediate Ocupancy
112	2	1.999999	Immediate Ocupancy
113	2	2.000003	Immediate Ocupancy
114	2	2	Immediate Ocupancy
115	2	2.000001	Immediate Ocupancy
116	2	2.000002	Immediate Ocupancy
117	2	1.999996	Immediate Ocupancy
118	2	2.000002	Immediate Ocupancy
119	2	2	Immediate Ocupancy

No.	Y	Y'	Keterangan
120	2	1.999995	Immediate Ocupancy
121	2	1.999999	Immediate Ocupancy
122	2	1.999995	Immediate Ocupancy
123	2	1.999993	Immediate Ocupancy
124	2	1.999999	Immediate Ocupancy
125	2	2	Immediate Ocupancy
126	2	2	Immediate Ocupancy
127	2	1.998391	Immediate Ocupancy
128	2	2.000004	Immediate Ocupancy
129	2	2	Immediate Ocupancy
130	2	2.000001	Immediate Ocupancy
131	2	1.999998	Immediate Ocupancy
132	2	1.999997	Immediate Ocupancy
133	2	2.000001	Immediate Ocupancy
134	2	2.000002	Immediate Ocupancy

LAMPIRAN 3 Perbandingan Data test dan Permodelan Percobaan 1

No	Y	Y''	Keterangan
1	2	2.000001	Immediate Ocupancy
2	2	2.000001	Immediate Ocupancy
3	2	2.000001	Immediate Ocupancy
4	2	2.000004	Immediate Ocupancy
5	2	2.000003	Immediate Ocupancy
6	2	2	Immediate Ocupancy
7	2	1.999999	Immediate Ocupancy
8	2	2.000002	Immediate Ocupancy
9	2	2.000005	Immediate Ocupancy
10	2	2	Immediate Ocupancy
11	4	3.999992	Structural Stability
12	4	3.999993	Structural Stability
13	4	3.999996	Structural Stability
14	4	3.999998	Structural Stability
15	2	2.000006	Immediate Ocupancy
16	2	2.000017	Immediate Ocupancy
17	2	2.000016	Immediate Ocupancy
18	2	2.000008	Immediate Ocupancy
19	2	1.999966	Immediate Ocupancy
20	2	1.999999	Immediate Ocupancy
21	2	2	Immediate Ocupancy
22	2	2.000002	Immediate Ocupancy
23	2	1.999995	Immediate Ocupancy

No	Y	Y''	Keterangan
24	2	2.000004	Immediate Ocupancy
25	2	1.999994	Immediate Ocupancy
26	2	1.999999	Immediate Ocupancy
27	2	2.000003	Immediate Ocupancy
28	2	2	Immediate Ocupancy
29	2	2.000001	Immediate Ocupancy
30	2	2.000002	Immediate Ocupancy
31	2	1.999996	Immediate Ocupancy
32	2	2.000002	Immediate Ocupancy
33	2	2	Immediate Ocupancy
34	2	1.999995	Immediate Ocupancy
35	2	1.999999	Immediate Ocupancy
36	2	1.999995	Immediate Ocupancy
37	2	1.999993	Immediate Ocupancy
38	2	1.999999	Immediate Ocupancy
39	2	2	Immediate Ocupancy
40	2	2	Immediate Ocupancy
41	2	1.998391	Immediate Ocupancy
42	2	2.000004	Immediate Ocupancy
43	2	2	Immediate Ocupancy
44	2	2.000001	Immediate Ocupancy
45	2	1.999998	Immediate Ocupancy
46	2	1.999997	Immediate Ocupancy
47	2	2.000001	Immediate Ocupancy

No	Y	Y''	Keterangan
48	2	2.000002	Immediate Ocupancy
49	2	2.000001	Immediate Ocupancy
50	2	2.000001	Immediate Ocupancy
51	2	2.000001	Immediate Ocupancy
52	2	2.000004	Immediate Ocupancy
53	2	2.000003	Immediate Ocupancy
54	2	2	Immediate Ocupancy
55	2	1.999999	Immediate Ocupancy
56	2	2.000002	Immediate Ocupancy
57	2	2.000005	Immediate Ocupancy
58	2	2	Immediate Ocupancy

LAMPIRAN 4 Perbandingan Data train dan Permodelan Percobaan 2

No.	Y	Y'	Keterangan
1	4	4.000005	Structural Stability
2	4	4.000005	Structural Stability
3	4	4.000005	Structural Stability
4	4	4.000006	Structural Stability
5	2	2.000001	Immediate Ocupancy
6	2	2.000008	Immediate Ocupancy
7	2	2.000005	Immediate Ocupancy
8	2	1.999999	Immediate Ocupancy
9	2	2.000001	Immediate Ocupancy
10	2	2.000001	Immediate Ocupancy
11	2	2.000001	Immediate Ocupancy
12	2	2	Immediate Ocupancy
13	2	2	Immediate Ocupancy
14	2	2	Immediate Ocupancy
15	2	2	Immediate Ocupancy
16	2	2	Immediate Ocupancy
17	2	2.000001	Immediate Ocupancy
18	2	2	Immediate Ocupancy
19	2	2	Immediate Ocupancy
20	2	2.000001	Immediate Ocupancy
21	2	2.000001	Immediate Ocupancy
22	2	2.000001	Immediate Ocupancy
23	2	2	Immediate Ocupancy

No.	Y	Y'	Keterangan
24	2	2.000001	Immediate Ocupancy
25	2	2	Immediate Ocupancy
26	2	2	Immediate Ocupancy
27	2	2	Immediate Ocupancy
28	2	2	Immediate Ocupancy
29	2	2.000001	Immediate Ocupancy
30	2	2	Immediate Ocupancy
31	2	2	Immediate Ocupancy
32	2	2	Immediate Ocupancy
33	2	2	Immediate Ocupancy
34	2	2	Immediate Ocupancy
35	2	2	Immediate Ocupancy
36	2	2	Immediate Ocupancy
37	2	2	Immediate Ocupancy
38	2	2	Immediate Ocupancy
39	2	2	Immediate Ocupancy
40	2	2	Immediate Ocupancy
41	2	2.000001	Immediate Ocupancy
42	2	2.000001	Immediate Ocupancy
43	2	2.000001	Immediate Ocupancy
44	2	2.000001	Immediate Ocupancy
45	2	2	Immediate Ocupancy
46	2	2.000001	Immediate Ocupancy
47	2	2.000001	Immediate Ocupancy

No.	Y	Y'	Keterangan
48	2	2.000001	Immediate Ocupancy
49	4	4.000006	Structural Stability
50	4	4.000005	Structural Stability
51	4	4.000006	Structural Stability
52	4	4.000005	Structural Stability
53	2	2.000001	Immediate Ocupancy
54	2	2.000009	Immediate Ocupancy
55	2	2.000005	Immediate Ocupancy
56	2	2.000001	Immediate Ocupancy
57	2	2.000001	Immediate Ocupancy
58	2	2.000001	Immediate Ocupancy
59	2	2.000001	Immediate Ocupancy
60	2	2	Immediate Ocupancy
61	2	2	Immediate Ocupancy
62	2	2	Immediate Ocupancy
63	2	2	Immediate Ocupancy
64	2	2	Immediate Ocupancy
65	2	2.000001	Immediate Ocupancy
66	2	2	Immediate Ocupancy
67	2	2	Immediate Ocupancy
68	2	2.000001	Immediate Ocupancy
69	2	2	Immediate Ocupancy
70	2	2	Immediate Ocupancy
71	2	2	Immediate Ocupancy

No.	Y	Y'	Keterangan
72	2	2	Immediate Ocupancy
73	2	2	Immediate Ocupancy
74	2	2	Immediate Ocupancy
75	2	2	Immediate Ocupancy
76	2	2	Immediate Ocupancy
77	2	2	Immediate Ocupancy
78	2	2	Immediate Ocupancy
79	2	2	Immediate Ocupancy
80	2	2	Immediate Ocupancy
81	2	2	Immediate Ocupancy
82	2	2	Immediate Ocupancy
83	2	2	Immediate Ocupancy
84	2	2	Immediate Ocupancy
85	2	2	Immediate Ocupancy
86	2	2	Immediate Ocupancy
87	2	2	Immediate Ocupancy
88	2	2	Immediate Ocupancy
89	2	2.000001	Immediate Ocupancy
90	2	2.000001	Immediate Ocupancy
91	2	2.000001	Immediate Ocupancy
92	2	2.000001	Immediate Ocupancy
93	2	2.000001	Immediate Ocupancy
94	2	2.000001	Immediate Ocupancy
95	2	2.000001	Immediate Ocupancy

No.	Y	Y'	Keterangan
96	2	2.000001	Immediate Ocupancy
97	4	4.000006	Structural Stability
98	4	4.000005	Structural Stability
99	4	4.000006	Structural Stability
100	4	4.000005	Structural Stability
101	2	2.000001	Immediate Ocupancy
102	2	2.000009	Immediate Ocupancy
103	2	2.000005	Immediate Ocupancy
104	2	2.000001	Immediate Ocupancy
105	2	2.000001	Immediate Ocupancy
106	2	2.000001	Immediate Ocupancy
107	2	2.000001	Immediate Ocupancy
108	2	2	Immediate Ocupancy
109	2	2	Immediate Ocupancy
110	2	2	Immediate Ocupancy
111	2	2	Immediate Ocupancy
112	2	2	Immediate Ocupancy
113	2	2.000001	Immediate Ocupancy
114	2	2	Immediate Ocupancy
115	2	2	Immediate Ocupancy
116	2	2.000001	Immediate Ocupancy
117	2	2	Immediate Ocupancy
118	2	2	Immediate Ocupancy
119	2	2	Immediate Ocupancy

No.	Y	Y'	Keterangan
120	2	2	Immediate Ocupancy
121	2	2	Immediate Ocupancy
122	2	2	Immediate Ocupancy
123	2	2	Immediate Ocupancy
124	2	2	Immediate Ocupancy
125	2	2	Immediate Ocupancy
126	2	2	Immediate Ocupancy
127	2	2	Immediate Ocupancy
128	2	2	Immediate Ocupancy
129	2	2	Immediate Ocupancy
130	2	2	Immediate Ocupancy
131	2	2	Immediate Ocupancy
132	2	2	Immediate Ocupancy
133	2	2	Immediate Ocupancy
134	2	2	Immediate Ocupancy

LAMPIRAN 5 Perbandingan Data test dan Permodelan Percobaan 2

No	Y	Y''	Keterangan
1	2	2	Immediate Ocupancy
2	2	2	Immediate Ocupancy
3	2	2.000001	Immediate Ocupancy
4	2	2.000001	Immediate Ocupancy
5	2	2.000001	Immediate Ocupancy
6	2	2.000001	Immediate Ocupancy
7	2	2.000001	Immediate Ocupancy
8	2	2.000001	Immediate Ocupancy
9	2	2.000001	Immediate Ocupancy
10	2	2.000001	Immediate Ocupancy
11	4	4.000006	Structural Stability
12	4	4.000005	Structural Stability
13	4	4.000006	Structural Stability
14	4	4.000005	Structural Stability
15	2	2.000001	Immediate Ocupancy
16	2	2.000009	Immediate Ocupancy
17	2	2.000005	Immediate Ocupancy
18	2	2.000001	Immediate Ocupancy
19	2	2.000001	Immediate Ocupancy
20	2	2.000001	Immediate Ocupancy
21	2	2.000001	Immediate Ocupancy
22	2	2	Immediate Ocupancy
23	2	2	Immediate Ocupancy

No	Y	Y''	Keterangan
24	2	2	Immediate Ocupancy
25	2	2	Immediate Ocupancy
26	2	2	Immediate Ocupancy
27	2	2.000001	Immediate Ocupancy
28	2	2	Immediate Ocupancy
29	2	2	Immediate Ocupancy
30	2	2.000001	Immediate Ocupancy
31	2	2	Immediate Ocupancy
32	2	2	Immediate Ocupancy
33	2	2	Immediate Ocupancy
34	2	2	Immediate Ocupancy
35	2	2	Immediate Ocupancy
36	2	2	Immediate Ocupancy
37	2	2	Immediate Ocupancy
38	2	2	Immediate Ocupancy
39	2	2	Immediate Ocupancy
40	2	2	Immediate Ocupancy
41	2	2	Immediate Ocupancy
42	2	2	Immediate Ocupancy
43	2	2	Immediate Ocupancy
44	2	2	Immediate Ocupancy
45	2	2	Immediate Ocupancy
46	2	2	Immediate Ocupancy
47	2	2	Immediate Ocupancy

No	Y	Y''	Keterangan
48	2	2	Immediate Ocupancy
49	2	2	Immediate Ocupancy
50	2	2	Immediate Ocupancy
51	2	2.000001	Immediate Ocupancy
52	2	2.000001	Immediate Ocupancy
53	2	2.000001	Immediate Ocupancy
54	2	2.000001	Immediate Ocupancy
55	2	2.000001	Immediate Ocupancy
56	2	2.000001	Immediate Ocupancy
57	2	2.000001	Immediate Ocupancy
58	2	2.000001	Immediate Ocupancy

LAMPIRAN 6 Perbandingan Data train dan Permodelan Percobaan 3

No.	Y	Y'	Keterangan
1	4	3.999996	Structural Stability
2	4	3.999999	Structural Stability
3	4	3.999999	Structural Stability
4	4	3.999995	Structural Stability
5	2	2.000002	Immediate Ocupancy
6	2	2.000007	Immediate Ocupancy
7	2	2.000004	Immediate Ocupancy
8	2	2.000001	Immediate Ocupancy
9	2	2.000001	Immediate Ocupancy
10	2	2.000002	Immediate Ocupancy
11	2	2.000003	Immediate Ocupancy
12	2	2.000001	Immediate Ocupancy
13	2	2	Immediate Ocupancy
14	2	2	Immediate Ocupancy
15	2	2	Immediate Ocupancy
16	2	2	Immediate Ocupancy
17	2	2	Immediate Ocupancy
18	2	2	Immediate Ocupancy
19	2	2	Immediate Ocupancy
20	2	2	Immediate Ocupancy
21	2	2	Immediate Ocupancy
22	2	2	Immediate Ocupancy
23	2	2	Immediate Ocupancy

No.	Y	Y'	Keterangan
24	2	2	Immediate Ocupancy
25	2	2	Immediate Ocupancy
26	2	2	Immediate Ocupancy
27	2	2	Immediate Ocupancy
28	2	2	Immediate Ocupancy
29	2	2	Immediate Ocupancy
30	2	2	Immediate Ocupancy
31	2	2.000001	Immediate Ocupancy
32	2	2	Immediate Ocupancy
33	2	2.000001	Immediate Ocupancy
34	2	2.000001	Immediate Ocupancy
35	2	2	Immediate Ocupancy
36	2	2	Immediate Ocupancy
37	2	2	Immediate Ocupancy
38	2	2	Immediate Ocupancy
39	2	2	Immediate Ocupancy
40	2	2	Immediate Ocupancy
41	2	2	Immediate Ocupancy
42	2	2	Immediate Ocupancy
43	2	2	Immediate Ocupancy
44	2	2	Immediate Ocupancy
45	2	2	Immediate Ocupancy
46	2	2	Immediate Ocupancy
47	2	2	Immediate Ocupancy

No.	Y	Y'	Keterangan
48	2	2	Immediate Ocupancy
49	4	3.999997	Structural Stability
50	4	3.999999	Structural Stability
51	4	3.999999	Structural Stability
52	4	3.999996	Structural Stability
53	2	2.000002	Immediate Ocupancy
54	2	2.000006	Immediate Ocupancy
55	2	2.000004	Immediate Ocupancy
56	2	2.000001	Immediate Ocupancy
57	2	2.000001	Immediate Ocupancy
58	2	2.000003	Immediate Ocupancy
59	2	2.000003	Immediate Ocupancy
60	2	2.000001	Immediate Ocupancy
61	2	2	Immediate Ocupancy
62	2	2	Immediate Ocupancy
63	2	2	Immediate Ocupancy
64	2	2	Immediate Ocupancy
65	2	2	Immediate Ocupancy
66	2	2	Immediate Ocupancy
67	2	2	Immediate Ocupancy
68	2	2	Immediate Ocupancy
69	2	2	Immediate Ocupancy
70	2	2	Immediate Ocupancy
71	2	2	Immediate Ocupancy

No.	Y	Y'	Keterangan
72	2	2	Immediate Ocupancy
73	2	2	Immediate Ocupancy
74	2	2	Immediate Ocupancy
75	2	2	Immediate Ocupancy
76	2	2	Immediate Ocupancy
77	2	2	Immediate Ocupancy
78	2	2	Immediate Ocupancy
79	2	2.000001	Immediate Ocupancy
80	2	2	Immediate Ocupancy
81	2	2.000001	Immediate Ocupancy
82	2	2.000001	Immediate Ocupancy
83	2	2	Immediate Ocupancy
84	2	2	Immediate Ocupancy
85	2	2	Immediate Ocupancy
86	2	2	Immediate Ocupancy
87	2	2	Immediate Ocupancy
88	2	2	Immediate Ocupancy
89	2	2	Immediate Ocupancy
90	2	2	Immediate Ocupancy
91	2	2	Immediate Ocupancy
92	2	2	Immediate Ocupancy
93	2	2	Immediate Ocupancy
94	2	2	Immediate Ocupancy
95	2	2	Immediate Ocupancy

No.	Y	Y'	Keterangan
96	2	2	Immediate Ocupancy
97	4	3.999997	Structural Stability
98	4	3.999999	Structural Stability
99	4	3.999999	Structural Stability
100	4	3.999996	Structural Stability
101	2	2.000002	Immediate Ocupancy
102	2	2.000006	Immediate Ocupancy
103	2	2.000004	Immediate Ocupancy
104	2	2.000001	Immediate Ocupancy
105	2	2.000001	Immediate Ocupancy
106	2	2.000003	Immediate Ocupancy
107	2	2.000003	Immediate Ocupancy
108	2	2.000001	Immediate Ocupancy
109	2	2	Immediate Ocupancy
110	2	2	Immediate Ocupancy
111	2	2	Immediate Ocupancy
112	2	2	Immediate Ocupancy
113	2	2	Immediate Ocupancy
114	2	2	Immediate Ocupancy
115	2	2	Immediate Ocupancy
116	2	2	Immediate Ocupancy
117	2	2	Immediate Ocupancy
118	2	2	Immediate Ocupancy
119	2	2	Immediate Ocupancy

No.	Y	Y'	Keterangan
120	2	2	Immediate Ocupancy
121	2	2	Immediate Ocupancy
122	2	2	Immediate Ocupancy
123	2	2	Immediate Ocupancy
124	2	2	Immediate Ocupancy
125	2	2	Immediate Ocupancy
126	2	2	Immediate Ocupancy
127	2	2.000001	Immediate Ocupancy
128	2	2	Immediate Ocupancy
129	2	2.000001	Immediate Ocupancy
130	2	2.000001	Immediate Ocupancy
131	2	2	Immediate Ocupancy
132	2	2	Immediate Ocupancy
133	2	2	Immediate Ocupancy
134	2	2	Immediate Ocupancy

LAMPIRAN 7 Perbandingan Data test dan Permodelan Percobaan 3

No	Y	Y''	Keterangan
1	2	2	Immediate Ocupancy
2	2	2	Immediate Ocupancy
3	2	2	Immediate Ocupancy
4	2	2	Immediate Ocupancy
5	2	2	Immediate Ocupancy
6	2	2	Immediate Ocupancy
7	2	2	Immediate Ocupancy
8	2	2	Immediate Ocupancy
9	2	2	Immediate Ocupancy
10	2	2	Immediate Ocupancy
11	4	3.999997	Structural Stability
12	4	3.999999	Structural Stability
13	4	3.999999	Structural Stability
14	4	3.999996	Structural Stability
15	2	2.000002	Immediate Ocupancy
16	2	2.000006	Immediate Ocupancy
17	2	2.000004	Immediate Ocupancy
18	2	2.000001	Immediate Ocupancy
19	2	2.000001	Immediate Ocupancy
20	2	2.000003	Immediate Ocupancy
21	2	2.000003	Immediate Ocupancy
22	2	2.000001	Immediate Ocupancy
23	2	2	Immediate Ocupancy

No	Y	Y''	Keterangan
24	2	2	Immediate Ocupancy
25	2	2	Immediate Ocupancy
26	2	2	Immediate Ocupancy
27	2	2	Immediate Ocupancy
28	2	2	Immediate Ocupancy
29	2	2	Immediate Ocupancy
30	2	2	Immediate Ocupancy
31	2	2	Immediate Ocupancy
32	2	2	Immediate Ocupancy
33	2	2	Immediate Ocupancy
34	2	2	Immediate Ocupancy
35	2	2	Immediate Ocupancy
36	2	2	Immediate Ocupancy
37	2	2	Immediate Ocupancy
38	2	2	Immediate Ocupancy
39	2	2	Immediate Ocupancy
40	2	2	Immediate Ocupancy
41	2	2.000001	Immediate Ocupancy
42	2	2	Immediate Ocupancy
43	2	2.000001	Immediate Ocupancy
44	2	2.000001	Immediate Ocupancy
45	2	2	Immediate Ocupancy
46	2	2	Immediate Ocupancy
47	2	2	Immediate Ocupancy

No	Y	Y''	Keterangan
48	2	2	Immediate Ocupancy
49	2	2	Immediate Ocupancy
50	2	2	Immediate Ocupancy
51	2	2	Immediate Ocupancy
52	2	2	Immediate Ocupancy
53	2	2	Immediate Ocupancy
54	2	2	Immediate Ocupancy
55	2	2	Immediate Ocupancy
56	2	2	Immediate Ocupancy
57	2	2	Immediate Ocupancy
58	2	2	Immediate Ocupancy



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www.ft.uisu.ac.id

Nomor : 216/KJS/FT-UISU/IX/2021
Lamp : -
Hal : Bimbingan Skripsi

Medan, 15 Shafar 1443 H
22 September 2021 M

Kepada : Yth : 1. Ir. Hj. Darlina Tanjung, MT
2. Ronal H.T. Simbolon, ST., MT.

Staf Pengajar Jurusan Teknik Sipil
Di -
Medan.

Assalamu'alaikum Wr, Wb.

Dengan hormat, teriring salam dan Do'a kami semoga Bapak dalam keadaan sehat wal'afiat dan sukses dalam menjalankan tugas Amin

Sehubungan dengan selesainya sebahagian besar tugas-tugas mata kuliah, Kerja Praktek (KP) dan berdasarkan surat permohonan mahasiswa tanggal 22 September 2021 serta usulan pengajuan Judul dan Pembimbing Tugas Skripsi atas nama :

Nama : Farino Pyanto
NPM : 71200913056

Maka dengan ini kami menghunjuk Bapak sebagai Dosen Pembimbing dari Tugas Skripsi tersebut diatas, dengan Judul : **"Prediksi Kerusakan Abutmen Jembatan Aek Malau dengan Metode Artificial Neural Network"**.

Demikian disampaikan atas perhatian dan kerjasama yang diberikan kami ucapkan terima kasih.

Wassalamu'alaikum Wr. Wb.



Ir. Hj. Darlina Tanjung, MT

Tembusan :
1. Yth. Dekan FT. UISU
2. Pertinggal



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www.ft.uisu.ac.id

Nomor : 013/KJS/FT-UISU/I/2022
Lamp : -
Hal : Izin Penelitian dan Pengambilan Data

Medan, 14 Jumadil Akhir 1443 H
17 Januari 2022 M

Kepada : Yth. Direktur
PT. Berlian Jaya Mandiri Konsultan
Di -
Medan

Assalamu'alaikum Wr, Wb.

Dengan hormat, sehubungan dengan permohonan mahasiswa program studi teknik sipil yang tersebut dibawah ini :

No	Nama	NPM
1.	Farino Pyanto	71200913056

Dengan ini kami bermohon kepada Bapak/Ibu Direktur PT. Berlian Jaya Mandiri Konsultan. kiranya berkenan mengizinkan Penelitian untuk mendapatkan data Struktur Perencanaan Jembatan Aek Malau.

Demikian Hal ini kami sampaikan dan sebelumnya kami ucapkan terima kasih.

Wassalamu'alaikum Wr, Wb.

Program Studi Sipil
Pit Ketua,

Ir. Hj. Darlina Tanjung, MT

Pertinggal