CHAPTER IV

CONCLUSION

Based on the results of the discussion in this report, several conclusions can be drawn related to the existing problem formulation. Formwork must be strong enough to support the weight and pressure of the concrete at the time of placement without causing. In this project, formwork is needed to form columns, beams, slabs, and walls in casting works in structural works. From the calculation of vertical formwork statical analysis we can conclude that using phenolich 18 mm plywood with strong class iii (1 panel size : 150 x 360 x 1.8 mm), girder gt 24, column waler srz 170 for column 150 x150 is save.

The beam casting process must be carried out together with the floor plate casting. Supporting equipment used for beam casting work includes concrete pumps, truck mixers, vibrators, work lights, and trowels. In the upper west project, the withdrawal of the prestress beam was carried out after the beam was cast. Prestress system to convert concrete into elastic material. Concrete that is not able to withstand tension and is strong enough to carry pressure is generally with high strength steel tensioned in such a way that the brittle load can carry the tensile stress. Because it has a special function, the concrete used for casting prestress beams is skirting concrete. Slump test abnd temperature test is carried out by adhimix and the qc of the upper west project to monitor and record the results. There is a casting monitoring sheet that must be filled in every time a casting is carried out with the aim that casting data can be recapitulated systematically. Based on the results of the concrete compressive strength test result analysis it can be concluded that the concrete used in prestressed beams with fc 45 fulfil the requirements. The difference between the measurement and the reasonable calculation result is ± 7% and the result of deviation calculation for PC 3 C1, C2, C3, C4 fulfil the requirement.

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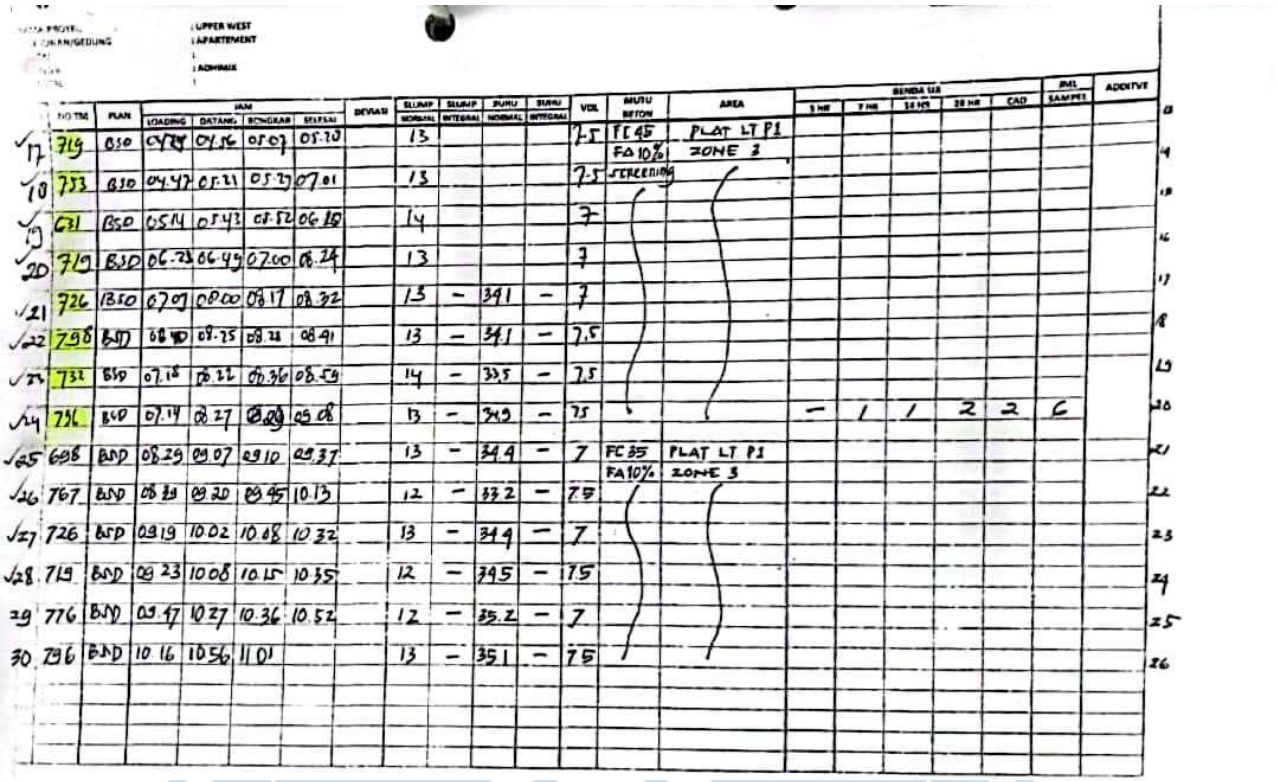
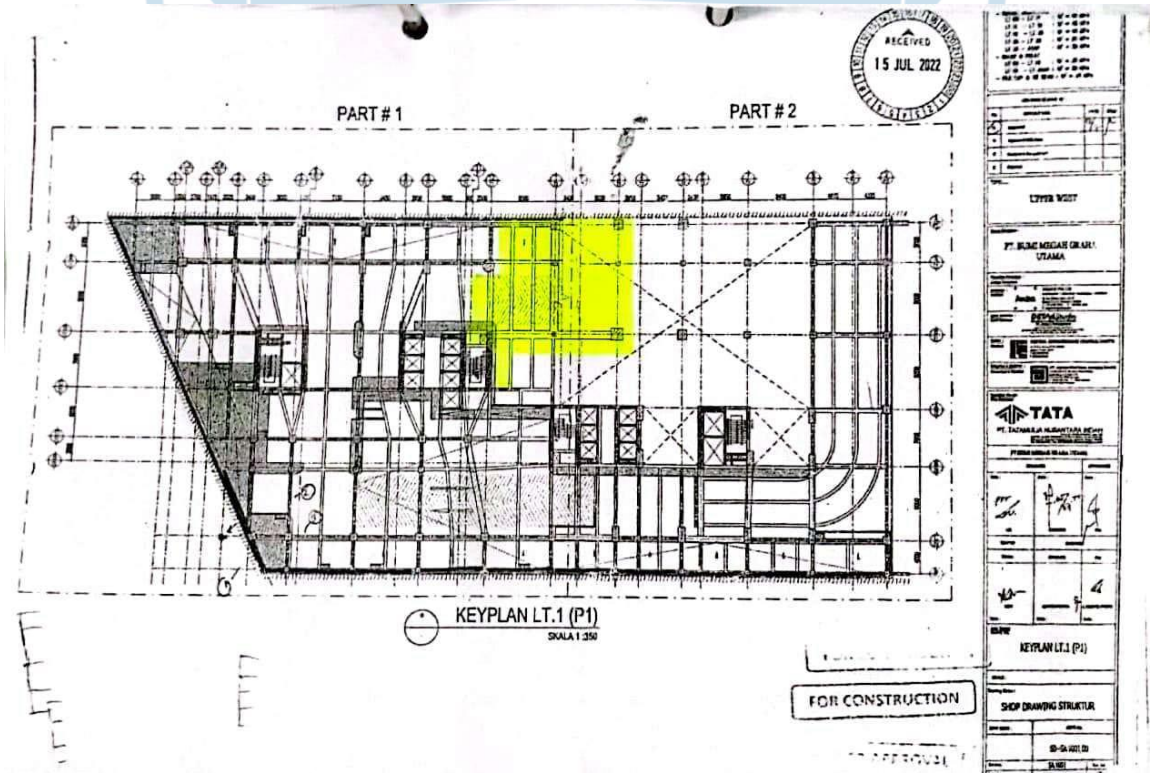
APPENDIX

Appendix 1



UPPER WEST
APARTEMENT

NO	NO TM	PLAN	JAM LOADING	JAM DATANG	JAM BONGKAR	JAM SELESAI	DEVIASI	SLUMP NORMAL	SLUMP INTEGRAL	SUHU NORMAL	SUHU INTEGRAL	VOL	MUTU BETON	AREA	BENDA UJI 3 HR	7 HR	14 HR	28 HR	CAD	JML SAMPEL	ADDITIVE
17	719	BSD	[illegible]	05.56	05.07	05.30		13				7.5	FC 45 FA 10% screening	PLAT LT P1 ZONE 3							
18	733	BSD	04.47	05.21	05.37	07.01		13				7.5									
19	731	BSD	05.14	05.43	05.52	06.16		14				7									
20	719	BSD	06.23	06.43	07.00	08.24		13				7									
21	726	BSD	07.07	08.00	08.17	08.32		13	-	391	-	7									
22	798	BSD	08.00	08.25	08.38	08.41		13	-	341	-	7.5									
23	732	BSD	07.18	08.22	08.36	08.59		14	-	335	-	7.5									
24	736	BSD	07.14	08.27	08.[illegible]	09.08		13	-	349	-	75			-	1	1	2	2	6	
25	698	BSD	08.29	09.07	09.10	09.37		13	-	349	-	7	FC 35 FA 10%	PLAT LT P1 ZONE 3							
26	767	BSD	08.[illegible]	09.20	09.45	10.13		12	-	332	-	75									
27	726	BSD	09.19	10.02	10.08	10.32		13	-	349	-	7									
28	719	BSD	09.23	10.08	10.15	10.35		12	-	345	-	175									
29	776	BSD	09.47	10.27	10.36	10.52		12	-	35.2	-	7									
30	796	BSD	10.16	10.56	11.01			13	-	351	-	75									



Appendix 1

TATA

(Nama Proyek)

FM/PRJ-100 REV 1

LAPORAN PENGECORAN BETON

Halaman : Dari :

DATA RENCANA PENGECORAN

Tanggal	01-10-22.
Jam Rencana Pengecoran	23.59 - 11.01 (Start - Finish)
Item Pekerjaan	PLAT LT P1 ZONE 3.
Lokasi Pengecoran	
Luas (*)	m²
Volume Rencana (*)	m³ (A)
Mutu Beton	FC 45+F+15 kg/cm²
Slump	12 ± 2. cm
Additive	
Metode Pengecoran	TC+Bucket / (Concrete Pump *)
Alat-alat Bantu	VIBRATOR / LAMPU TL

Perincian Volume Rencana (A)	
Pondasi	m³
Pile cap	m³
Tie Beam	m³
Balok	m³
Pelat lantai	180. m³
Kolom	m³
Dinding	m³
Tangga	m³
Lain-lain	m³

Keterangan Dimensi Struktur

(bila perlu lampirkan data perhitungan)

QS Penanggungjawab data: Fikri Bima — paraf — Tgl 01/22/10

REPORT PENGECORAN

No. PPSbP	045
No. SIB	045
Kondisi Cuaca	(Cerah) / Mendung / Hujan *
Keterangan Cuaca	CERAH
Jam Mulai	23.59
Jam Selesai	11 01
Jumlah Truk Mixer (yang datang ke proyek)	30
Jumlah Truk Mixer (yang lolos Slump Test)	
Volume Beton (yang lolos Slump Test)	180,5 m³ (a)
Volume Actual (berdasarkan volume area yang dicor)	m³ (b)
Beton Downgrade	m³ (c)
Volume Waste	9,5. m³ (a-A)
Waste Total	5,28% [(a-A)/A)x100%]
Waste Pengecoran	5,28% [(b-A)/A)x100%]

(*) Coret yang Tidak Perlu

Masalah yang terjadi selama pengecoran

1. Peralatan (apakah peralatan berjalan dg baik)
   BERJALAN DENGAN BAIK
2. Material (apakah cycle kedatangan beton terhambat)
   KEDATANGAN BETON TERLAMBAT
3. Personel (apakah supervisor & pekerja sudah tercukupi)
   SUDAH TERCUKUPI
4. Safety (apakah terjadi kelalaian dalam bekerja)
   TIDAK TERJADI
5. Lain-lain (apakah terjadi penyimpangan, seperti penambahan air)
   TIDAK TERJADI

Mengetahui (PM)	Dilaporkan Oleh (Chief QA-QC/QC))
Tanggal	Tanggal 01/10-22

PPSDP = Pemeriksaan Pekerjaan Sebelum Pengecoran (IK/CB/ST-012/R1)
SIB = Surat Ijin Bekerja (FM/SFT-1/03)
Skalsa rencana cor/denah pengecoran agar dilampirkan

Downgrade = Material diterima namun untuk penggunaan lain (slump jatuh)
Reject = Material yang tidak sesuai ditolak & dikembalikan

Menunggu Hasil Evaluasi Uji Tekan.
01.

Appendix 1

TATA

DAFTAR MONITORING PENGECORAN UPPER WEST

FM/K-021/01

PROYEK : UPPER WEST
Tipe Sampel (O)
☐ Kubus
√ Silinder

NO	SUPPLIER	NOMOR MOBIL	JAM				DEVIASI	SLUMP	SLUMP	SUHU	SUHU	VOLUME (M3)	TGL COR	UMUR (HARI)	TANGGAL TES		JUMLAH SAMPEL	LOKASI / ASAL PENGAMBILAN	KODE	MUTU BETON	ADDITIVE (Integral)	LEMBAGA / TEMPAT TEST	HASIL TEST (Rpa)	%
			LOADING	DATANG	BONGKAR	SELESAI		NORMAL	INTRGAL	NORMAL	INTRGAL				RENCANA	REALISASI								
1	**BSD**	719	23,59	0,35	1,14	1,22		14		37,7		7,5	01 Oktober 2022	3	04 Oktober 2022	04 Oktober 2022	1					ACHMIX	**26,39**	
														7	08 Oktober 2022	10 Oktober 2022						**MIXINDO**	**34,52**	
														14	15 Oktober 2022	15 Oktober 2022	1	LT P1	**PLAT LT P1 ZONE 3**	FC 45 SCREENING		ACHMIX	**44,79**	
														21	22 Oktober 2022	24 Oktober 2022	1					**MIXINDO**	**45,27**	
														28	29 Oktober 2022	01 November 2022	1					**MIXINDO**	**51,21**	
														28	29 Oktober 2022	01 November 2022						**MIXINDO**	**48,10**	
2	BSD	631	0,07	0,45	1,04	1,12		13		37		7												
3	**BSD**	733	0,17	0,45	1,37	1,53		12,5		37,1		7,5	01 Oktober 2022	3	04 Oktober 2022	04 Oktober 2022	1					ACHMIX	**26,86**	
														7	08 Oktober 2022	10 Oktober 2022						**MIXINDO**	**33,95**	
														14	15 Oktober 2022	15 Oktober 2022	1	LT P1	**PLAT LT P1 ZONE 3**	FC 45 SCREENING		ACHMIX	**43,65**	
														21	22 Oktober 2022	24 Oktober 2022	1					**MIXINDO**	**44,14**	
														28	29 Oktober 2022	01 November 2022	1					**MIXINDO**	**48,38**	
														28	29 Oktober 2022	01 November 2022						**MIXINDO**	**49,52**	
4	BSD	732	0,21	1,00	1,23	1,36		12		36,9		7,5												
5	BSD	757	0,37	1,11	1,35	***RJECT***																		
6	BSD	752	1,06	1,40		***RJECT***																		
7	BSD	721	1,02	1,40		***RJECT***																		
8	**BSD**	796	1,26	1,54	2,52	3,40		11				7,5	01 Oktober 2022	3	04 Oktober 2022	04 Oktober 2022	1					ACHMIX	**26,17**	
														7	08 Oktober 2022	10 Oktober 2022						**MIXINDO**	**34,24**	
														14	15 Oktober 2022	15 Oktober 2022	1	LT P1	**PLAT LT P1 ZONE 3**	FC 45 SCREENING		ACHMIX	**44,25**	
														21	22 Oktober 2022	24 Oktober 2022	1					**MIXINDO**	**44,99**	
														28	29 Oktober 2022	01 November 2022	1					**MIXINDO**	**48,67**	
														28	29 Oktober 2022	01 November 2022						**MIXINDO**	**48,95**	
9	BSD	716	1,46	2,22		***RJECT***																		
10	**BSD**	756	1,57	2,23	2,48	3,26		13				7,5												
11	BSD	631	2,11	2,48	3,21	4,18		14				7												
12	BSD	664	2,32	2,57	3,41	4,18		14				7												
13	BSD	700	3,39	4,16	4,29	4,50		13				7,5												
14	**BSD**	11086	3,40	4,10	4,22	4,40		14				7	01 Oktober 2022	3	04 Oktober 2022	04 Oktober 2022	1					ACHMIX	**25,65**	
														7	08 Oktober 2022	10 Oktober 2022						**MIXINDO**	**34,80**	
														14	15 Oktober 2022	15 Oktober 2022	1	LT P1	**PLAT LT P1 ZONE 3**	FC 45 SCREENING		ACHMIX	**43,20**	
														21	22 Oktober 2022	24 Oktober 2022	1					**MIXINDO**	**43,57**	
														28	29 Oktober 2022	01 November 2022	1					**MIXINDO**	**49,23**	
														28	29 Oktober 2022	01 November 2022						**MIXINDO**	**50,65**	
15	**BSD**	698	3,58	4,31	4,44	4,52		13				7												
16	BSD	756	4,14	4,45	4,59	5,20		12				7,5												
17	BSD	719	4,15	4,56	5,07	5,28		13				7,5												

PT. MIXINDO ABADI KARYA
Head Office & Laboratory
Jl. Masjid Baiturrahim No. 73 BINTARO Tangerang Selatan - Banten 15222.
Telp. : +62 21 276 598 17 Fax : +62 21 276 598 17

LAPORAN HASIL PENGUJIAN KUAT TEKAN

NOMOR LAPORAN / Report Number : 04068 / TB / MAK-LAB / X / 2022
DIBUAT UNTUK / Executed for : PT TATAMULIA NUSANTARA INDAH
PROYEK / Project : UPPER WEST APARTEMENT
JENIS BENDA UJI / Type of Specimen : SILINDER Ø 15 x 30 cm
TANGGAL PENDAFTARAN / Registration : 20 Oktober 2022

No	Kode	Tanggal		Umur (hari)	Luas Penampang (cm^2)	Berat (kg)	Beban (kN)	Kuat Tekan MPa (N/mm^2)	Pola Retak	Keterangan
		Cor	Uji							
1	TATA - UW / PLAT LT.P1 ZONE 3 / FC 45 SCREENING / TM 719	01/10/22	24/10/22	23	176,71	12,40	800	45,27	3	
2	TATA - UW / PLAT LT.P1 ZONE 3 / FC 45 SCREENING / TM 733	01/10/22	24/10/22	23	176,71	12,41	780	44,14	3	
3	TATA - UW / PLAT LT.P1 ZONE 3 / FC 45 SCREENING / TM 796	01/10/22	24/10/22	23	176,71	12,39	795	44,99	3	
4	TATA - UW / PLAT LT.P1 ZONE 3 / FC 45 SCREENING / TM 11086	01/10/22	24/10/22	23	176,71	12,40	770	43,57	3	
5	TATA - UW / PLAT LT.P1 ZONE 3 / FC 45 SCREENING / TM 796	01/10/22	24/10/22	23	176,71	12,42	805	45,55	3	

* (ASTM C-39/C 39M-04a)

Pilih Pola Retak sesuai gambar dibawah ini :

Bintaro, 24 Oktober 2022
Laboratorium Beton

DR. PRIANAP TUA NAIBAHO, ST, MT
Kepala Laboratorium

Stressing Record Sheet OVM System

Project : UPPER WEST
BSD
Client : PT. TATAMULIA NUSANTARA INDAH
Date stressed :
Type of work : Prestressed Concrete Beam

Beam Names : pc. 3.

Equipment details			Stressing details		
Manometer No	: 03.		Tendon Identification	: C-1.	
Jack type	: SJ300		Tendon type	: OVM13- 15.	
Jack Capacity	: 3000	kN	Dia. of strand	: 12.7	mm
Ram area of Jack	: 577.3	cm^2	Nominal area of strand	: 98.71	mm^2
			Ultimate Tensile Strength	: 184	kN
			Beam length	:	meter
			Tendon length	: 15,900.	meter
Compressive Strength			Jacking Force	: 75-0/6 / 138.	kN
At 28 days	:	N/mm^2	Pressure	: 5347	psi
At transfer	:	N/mm^2	Tendon Elongation	: 99,3.	mm

Pressure reading (psi)	Incremental Extension (mm)	Total Extension (mm)	Deviation Calculation
1000	5.		$\frac{5347}{4347}(87-6) = 99.6.\ MM.$
2000	25.		
3000	44.		$D = \frac{99.6 - 99.3}{99.3} \times 100$
4000	64.		
5000	84.		
5347.	92.	92 - 5 = 87	
			D = + 0,3. %

PT. MULTISTRAN ENGINEERING Stressing Operator	SUTHERLAND.	Date: 02/11 - 22
PT. TATAMULIA NUSANTARA INDAH Checked by	TRIH.	Date: 02/11 - 22
CONSTRUCTION MANAGEMENT Acknowledged by	BMGU ROHANDA	Date: 02-11-2022

Stressing Record Sheet OVM System

Project : UPPER WEST
BSD
Client : PT. TATAMULIA NUSANTARA INDAH
Date stressed :
Type of work : Prestressed Concrete Beam

Beam Names : pc. 3.

Equipment details

Manometer No : 03.
Jack type : SJ300
Jack Capacity : 3000 kN
Ram area of Jack : 577.3 cm²

Compressive Strength

At 28 days : N/mm²
At transfer : N/mm²

Stressing details

Tendon Identification : C. 2.
Tendon type : OVM13- 15.
Dia. of strand : 12.7 mm
Nominal area of strand : 98.71 mm²
Ultimate Tensile Strength : 184 kN
Beam length : meter
Tendon length : 15,900 meter
Jacking Force : 75 % / 138. kN
Pressure : 5347 psi
Tendon Elongation : 99,3. mm

Pressure reading (psi)	Incremental Extension (mm)	Total Extension (mm)	Deviation Calculation
1000	5.		5347/4347 (89.-6) = 102,1. MM.
2000	25.		
3000	45.		D= 102,1 - 99,3 / 99,3 x 100.
4000	66.		
5000	86.		
5347.	94.	94-5 = 89	
			D= + 2,8. %

PT. MULTISTRAN ENGINEERING Stressing Operator	Supervisor.	Date: 02/11-22.
PT. TATAMULIA NUSANTARA INDAH Checked by	Fadly. F TA H.	Date: 02/11-22
CONSTRUCTION MANAGEMENT Acknowledged by	BMBV Roland	Date: 02-11-2022

Stressing Record Sheet OVM System

Project : UPPER WEST
BSD

Client : PT. TATAMULIA NUSANTARA INDAH

Date stressed : 02 - 11 - 2022.

Type of work : Prestressed Concrete Beam

Beam Names : pc. 3.

Equipment details

Manometer No : 03 .
Jack type : SJ300
Jack Capacity : 3000 kN
Ram area of Jack : 577.3 cm^2

Compressive Strength

At 28 days : ____ N/mm^2
At transfer : ____ N/mm^2

Stressing details

Tendon Identification : C. 3 -
Tendon type : OVM13- 15 .
Dia. of strand : 12.7 mm
Nominal area of strand : 98.71 mm^2
Ultimate Tensile Strength : 184 kN
Beam length : ____ meter
Tendon length : 15,900 . meter
Jacking Force : 75. % / 138 . kN
Pressure : 5347 . psi
Tendon Elongation : 101,8. mm

Pressure reading (psi)	Incremental Extension (mm)	Total Extension (mm)	Deviation Calculation
1000	5.		$\frac{5347}{4347}(89.-6) = 102,1.$ MM
2000	25		
3000	45		$D = \frac{102,1 - 101,8}{101,8} \times 100$
4000	66.		
5000	86.		
5347.	94.	94 - 5 = 89.	D = + 0,28. %

PT. MULTISTRAN ENGINEERING Stressing Operator	Esther Lau.	Date: 02/11 - 22.
PT. TATAMULIA NUSANTARA INDAH Checked by	Fadly. F TPH H.	Date: 02/11 - 22
CONSTRUCTION MANAGEMENT Acknowledged by	BMGN	Date: 02-11-2022

Stressing Record Sheet OVM System

Project : UPPER WEST
BSD
Client : PT. TATAMULIA NUSANTARA INDAH
Date stressed : 02 - 11 - 2022.
Type of work : Prestressed Concrete Beam

Beam Names : pc. 3.

Equipment details			Stressing details		
Manometer No	: 03.		Tendon Identification	: C. 4	
Jack type	: SJ300		Tendon type	: OVM13- 15.	
Jack Capacity	: 3000	kN	Dia. of strand	: 12.7	mm
Ram area of Jack	: 577.3	cm^2	Nominal area of strand	: 98.71	mm^2
			Ultimate Tensile Strength	: 184	kN
			Beam length	:	meter
			Tendon length	: 15,900	meter
Compressive Strength			Jacking Force	: 75. 0/0 / 138.	kN
At 28 days	:	N/mm^2	Pressure	: 5347	psi
At transfer	:	N/mm^2	Tendon Elongation	: 101.8 .	mm

Pressure reading (psi)	Incremental Extension (mm)	Total Extension (mm)	Deviation Calculation
1000	5.		5347 (88.-6) = 100,86. MM
2000	25.		4347
3000	45.		D= 100,86 - 101,8 / 101,8 x 100
4000	66.		
5000	86.		
5347.	93.	93-5 = 88.	
			D= - 0,9. %

PT. MULTISTRAN ENGINEERING Stressing Operator	Sutherlan.	Date: 02/11-22.
PT. TATAMULIA NUSANTARA INDAH Checked by	Fadly. F TRI IJ.	Date: 02/11-22
CONSTRUCTION MANAGEMENT Acknowledged by	BMGV Robert	Date: 02-11-2022

Appendix 3

PT. MULTIstran Engineering

PROJECT : BALOK PRESTRESS UPPER WEST
LOCATION : BSD
ITEM : BALOK PRESTRESS

LIST PROPOSAL OF STRESSING BALOK PRESTRESS (75% UTS)

Name of Beam	Name of Tendon	Tendon Length (m)	Strand in Tendon	Jacking Force per strand (kN)	% UTS	Manometer Pressure (psi)	Elongation Estimated (mm)	Stressing Direction	Compressive Strength fc' (Mpa)	Jack Type	Ram Area (cm²)	Stressing Order	Prosentase
PC-1	C1	13.895	12	138.00	75	4291	87.5	One side	45	SJ-300	577.3	I	100%
	C2	13.895	12	138.00	75	4291	87.5	One side	45	SJ-300	577.3	II	100%
	C3	13.895	11	138.00	75	3934	89.5	One side	45	SJ-300	577.3	III	100%
	C4	13.895	11	138.00	75	3934	89.5	One side	45	SJ-300	577.3	IV	100%
PC-2	C1	18.550	19	138.00	75	6734	111.8	One side	45	SJ-300	577.3	I	100%
	C2	18.550	19	138.00	75	6734	111.8	One side	45	SJ-300	577.3	III	100%
	C3	18.550	18	138.00	75	6375	115.6	One side	45	SJ-300	577.3	II	100%
	C4	18.550	18	138.00	75	6375	115.6	One side	45	SJ-300	577.3	IV	100%
PC-3	C1	15.900	15	138.00	75	5347	99.3	One side	45	SJ-300	577.3	I	100%
	C2	15.900	15	138.00	75	5347	99.3	One side	45	SJ-300	577.3	II	100%
	C3	15.900	15	138.00	75	5347	101.8	One side	45	SJ-300	577.3	III	100%
	C4	15.900	15	138.00	75	5347	101.8	One side	45	SJ-300	577.3	IV	100%
PC-4	C1	16.050	15	138.00	75	5347	100.2	One side	45	SJ-300	577.3	I	100%
	C2	16.050	15	138.00	75	5347	100.2	One side	45	SJ-300	577.3	III	100%
	C3	16.050	12	138.00	75	4291	102.7	One side	45	SJ-300	577.3	II	100%
	C4	16.050	12	138.00	75	4291	102.7	One side	45	SJ-300	577.3	IV	100%
PC-5	C1	15.900	14	138.00	75	5013	99.2	One side	45	SJ-300	577.3	I	100%
	C2	15.900	14	138.00	75	5013	99.2	One side	45	SJ-300	577.3	II	100%
	C3	15.900	12	138.00	75	4291	101.6	One side	45	SJ-300	577.3	III	100%
	C4	15.900	12	138.00	75	4291	101.6	One side	45	SJ-300	577.3	IV	100%
PC-6	C1	18.550	14	138.00	75	5013	116.4	One side	45	SJ-300	577.3	I	100%
	C2	18.550	14	138.00	75	5013	116.4	One side	45	SJ-300	577.3	III	100%

Notes: Perhitungan pressure (psi) berdasarkan hasil interpolasi kalibrasi Jack SJ-300 - 03

PT. MULTIstran Engineering

CALCULATION OF PC STRAND ELONGATION

PROJECT TITLE :	UPPER WEST BSD
ITEM :	PC-3 C1C2 2xOVM13-15

Coefficient of friction (μ) 0.200
Coefficient of Wobble (K) 0.0020
Draw in (δ) ..... 6.0 mm
Jacking Force (one PC strand) ..... 138.00 kN
Ratio of jacking force to UTS ..... 75.000 % UTS
Elasticity modulus of PC strand (E) 195.00 kN/mm2
PC Strand area of cross section 98.71 mm2
Ultimate Tensile Strength (UTS) ..... 184.00 kN
1000 hour Relaxation of PC strand ..... 2.50 %

Stresssing from left side.

segment no	length (m)	drape length	ya (m)	yb (m)	1/R	-(μx/R+Kx) e	delta cum left	delta cum right	area left (1)	area right (1)	area left (2)	area right (2)	area left (3)	area right (3)
							1.0000	0.0000				0.000		
1	0.475	0.475	1.0450	1.0450	0.0000	0.999050			0.475	0.000	0.475		0.475	
							0.9991	0.0000						
2	0.700	0.700	1.0450	1.0450	0.0000	0.998601			0.699	0.000	0.699		0.699	
							0.9977	0.0000						
3	1.350	2.700	1.0450	0.9140	0.1438	0.959335			1.319	0.000	1.319		1.319	
							0.9571	0.0000						
4	7.650	15.300	0.9140	0.1400	0.0265	0.945756			7.123	0.000	7.123		7.123	
							0.9052	0.0000						
5	4.775	15.300	1.0450	0.1400	0.0309	0.961668			4.239	0.000	4.239		4.239	
							0.8705	0.0000			0.000			

Length :	
Free :	14.950
Bond :	0.950
Total :	15.900

area	13.856	0.000	13.856	0.000	13.856	0.000
area/EA	99.3	0.0	99.3	0.0	99.3	0.0

TENDON ELONGATION :

- single end stressing :
left end extension = ... 99.3 mm

SH - 26 / 10 / 2022
17 : 55 : 31.00