

BAB VI

KESIMPULAN

6.1.Kesimpulan

Berdasarkan hasil penelitian yang dilakukan, jawaban dari permasalahan awal yang ada dalam penelitian ini adalah :

1. Jenis dan persentase limbah
 - a. Persentase limbah kuda-kuda keseluruhan
 - 1) Material Z95.08 antara 0.84% hingga 29.73%
 - 2) Material C75.08 antara 1.66% hingga 12.55%
 - b. Persentase limbah kebutuhan lapangan keseluruhan
 - 1) Material Z95.08 antara 0% hingga 9.59%
 - 2) Material C75.08 antara 1.24% hingga 9.40%
 - 3) Material TH35.045 antara 2.07% hingga 10.21%
2. Penerapan metode pemotongan untuk pengurangan limbah

Pemotongan dilakukan tidak hanya mempertimbangkan kemudahan dalam pengangkutan material ke lokasi proyek. Usaha meminimalkan limbah material perlu mempertimbangkan kombinasi pemotongan material. Dalam hal ini meskipun ukuran kuda-kuda relatif kecil atau kebutuhan panjang material kurang dari 1 panjang profil, lebih baik dipotong dengan kombinasi dan tetap memperhatikan keamanan struktur.

3. Perhitungan pengurangan limbah material dengan mengubah metode pemotongan dengan kombinasi baru dilakukan pada 3 bentang kuda-kuda atap pelana. Minimasi limbah dilakukan pada profil Z95.08.

- a. Proyek P1 bentang 3.1 meter penurunan persentase limbah 26.18%
- b. Proyek P2 bentang 3.78 meter penurunan persentase limbah 10.29%
- c. Proyek P3 bentang 5.16 meter penurunan persentase limbah 10.27%



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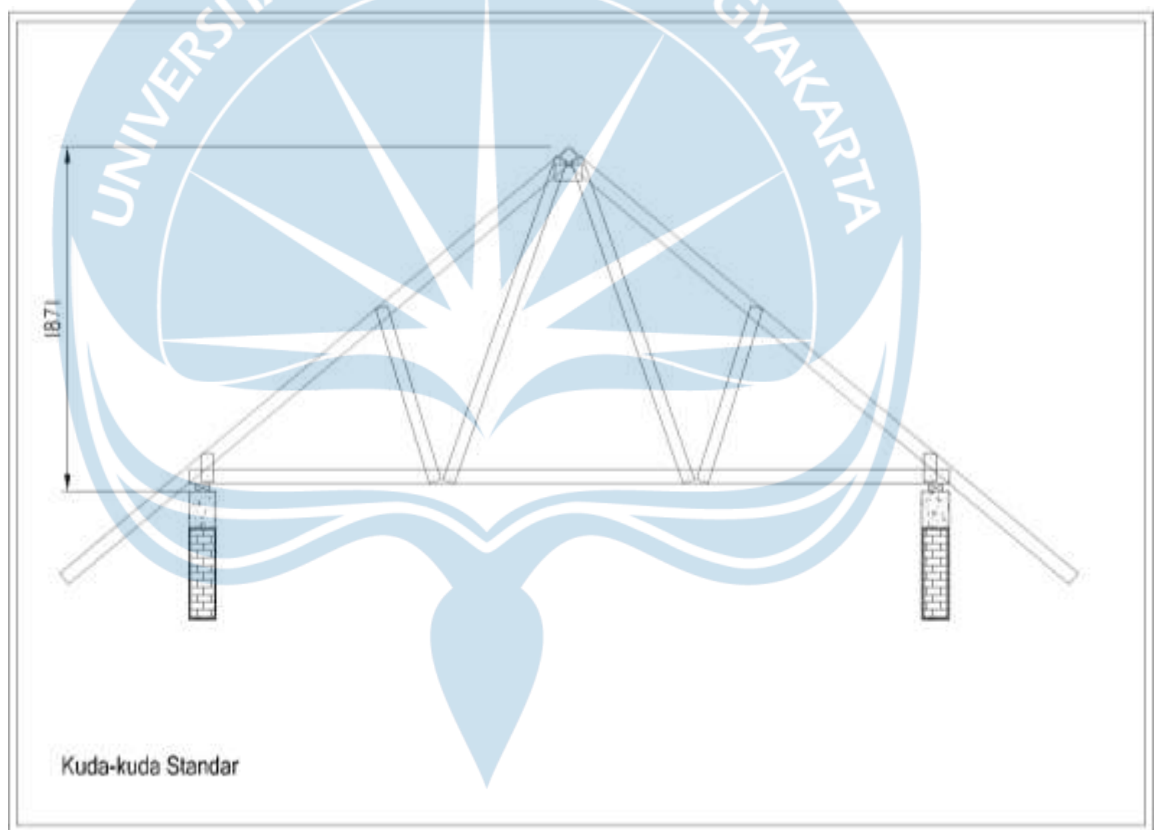


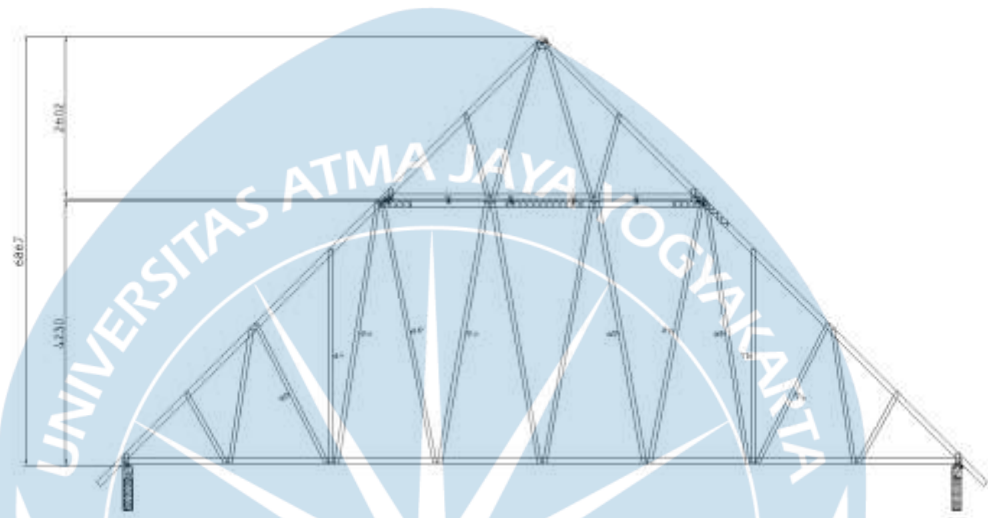
Lampiran 1 :

BENTUK KUDA-KUDA STANDAR dan SEDERHANA TIDAK BERTUMPUK

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Lampiran 1. Bentuk Kuda-kuda





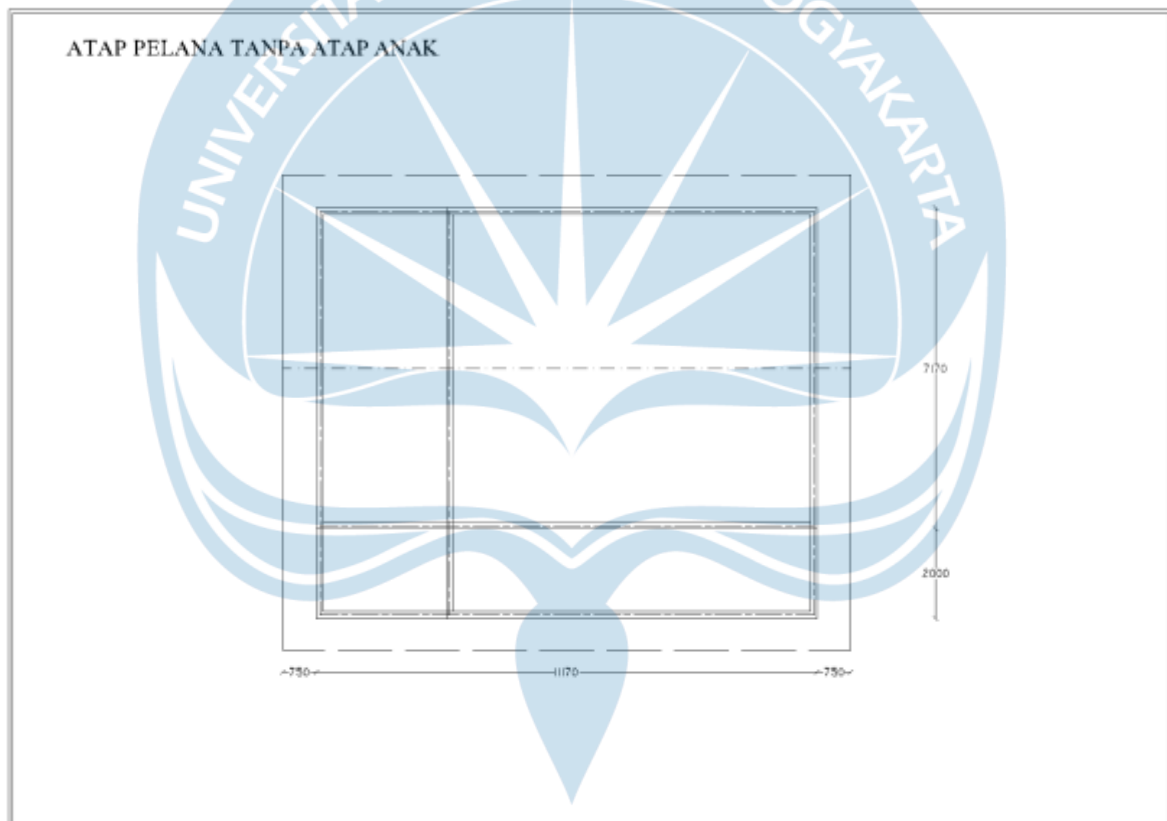
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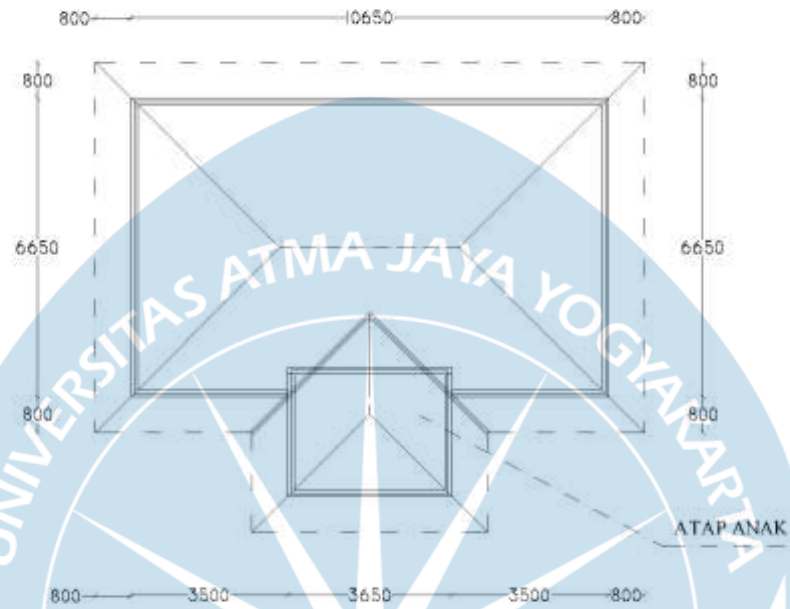
Lampiran 2 : **DENAH ATAP dengan ATAP ANAK**

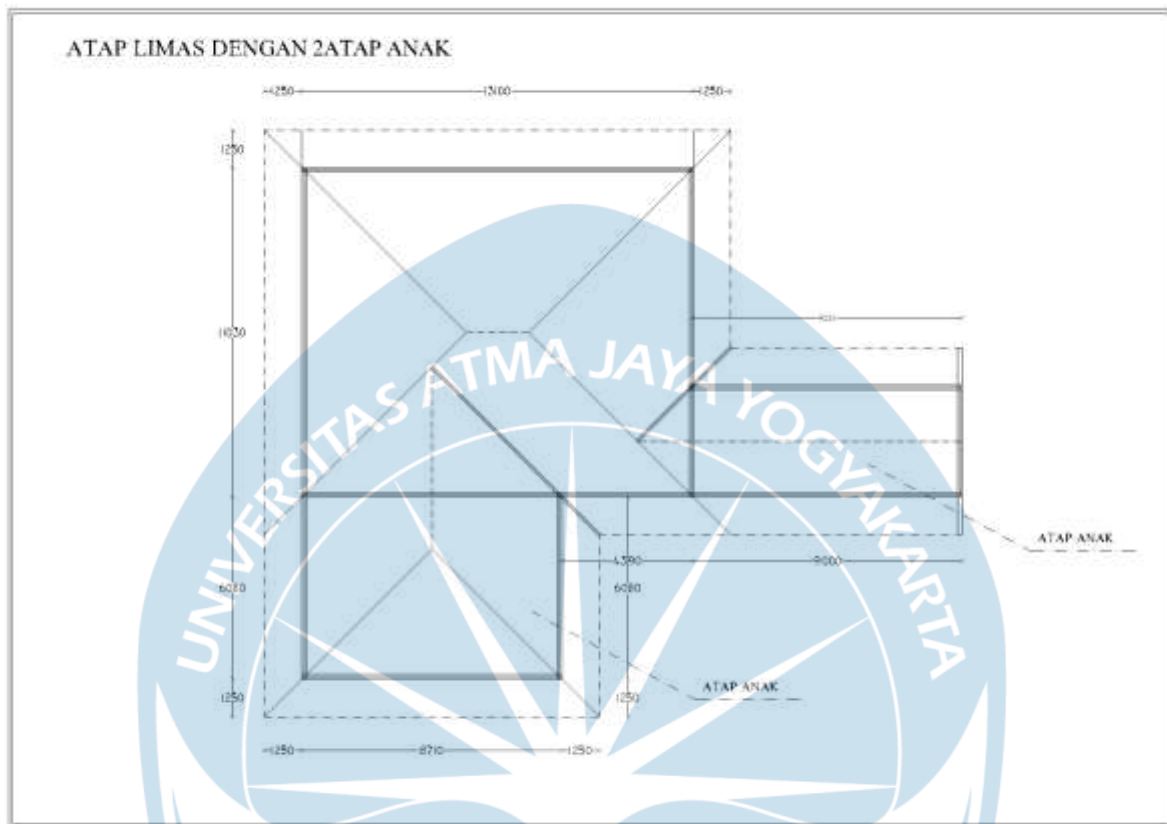
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Lampiran 2. Bentuk Atap



ATAP LIMAS DENGAN 1 ATAP ANAK







Lampiran 3 :

Ukuran Penampang, Tebal dan Berat Minimum Profil

Rangka Baja Ringan

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Lampiran 3. Profil Baja Ringan

No	Profil	Dimensi nominal							Tebal nominal	Berat minimal per m ² (kg/m) termasuk lapisan					Aplikasi				Lebar sheet minimum (sebagai referensi/tidak diukur) (mm)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		A	B	C	D	E	R (mm)	mm		mm	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm

No	Profil	Dimensi nominal										Tebal nominal	Berat minimal per m' (kg/m) termasuk lapisan				Aplikasi			Lebar sheet minimum (sebagai referensi/ tidak diukur) (mm)
		A	B	C	D	E	R (min)	α1	α2	β1	β2		Bj.LS Z18	Bj.LS Z22	Bj.LAS AS100	Bj.LASM K12	Rangka lantai	Rangka dinding struktural	Rangka atap	
1	Z90	mm										mm								
		90	45	45	15	15	1,6	90°	90°	90°	90°	-	1,235	1,212	1,210	✓	✓	✓	✓	
		90	45	45	15	15	1,8	90°	90°	90°	90°	-	1,384	1,361	1,359	✓	✓	✓	✓	
		90	45	45	15	15	2,0	90°	90°	90°	90°	1,00	1,533	1,511	1,509	✓	✓	✓	✓	
		100	45-51	40-47	10-12	10-12	1,6	90°	90°	90°	90°	0,80	1,300	1,276	1,274	✓	✓	✓	✓	
		100	45-51	40-47	10-12	10-12	1,8	90°	90°	90°	90°	0,90	1,457	1,433	1,431	✓	✓	✓	✓	
2	Z100	100	45-51	40-47	10-12	10-12	2,0	90°	90°	90°	90°	1,00	1,614	1,590	1,588	✓	✓	✓	✓	
		150	65	60	13	13	2,5	90°	90°	90°	90°	0,80	1,918	1,882	1,879	✓	✓	✓	✓	
		150	65	60	13	13	2,5	90°	90°	90°	90°	0,90	2,149	2,114	2,111	✓	✓	✓	✓	
3	Z150	150	65	60	13	13	2,5	90°	90°	90°	90°	1,00	2,381	2,345	2,342	✓	✓	✓	✓	
		150	65	60	13	13	2,5	90°	90°	90°	90°	1,10	2,612	2,577	2,574	✓	✓	✓	✓	

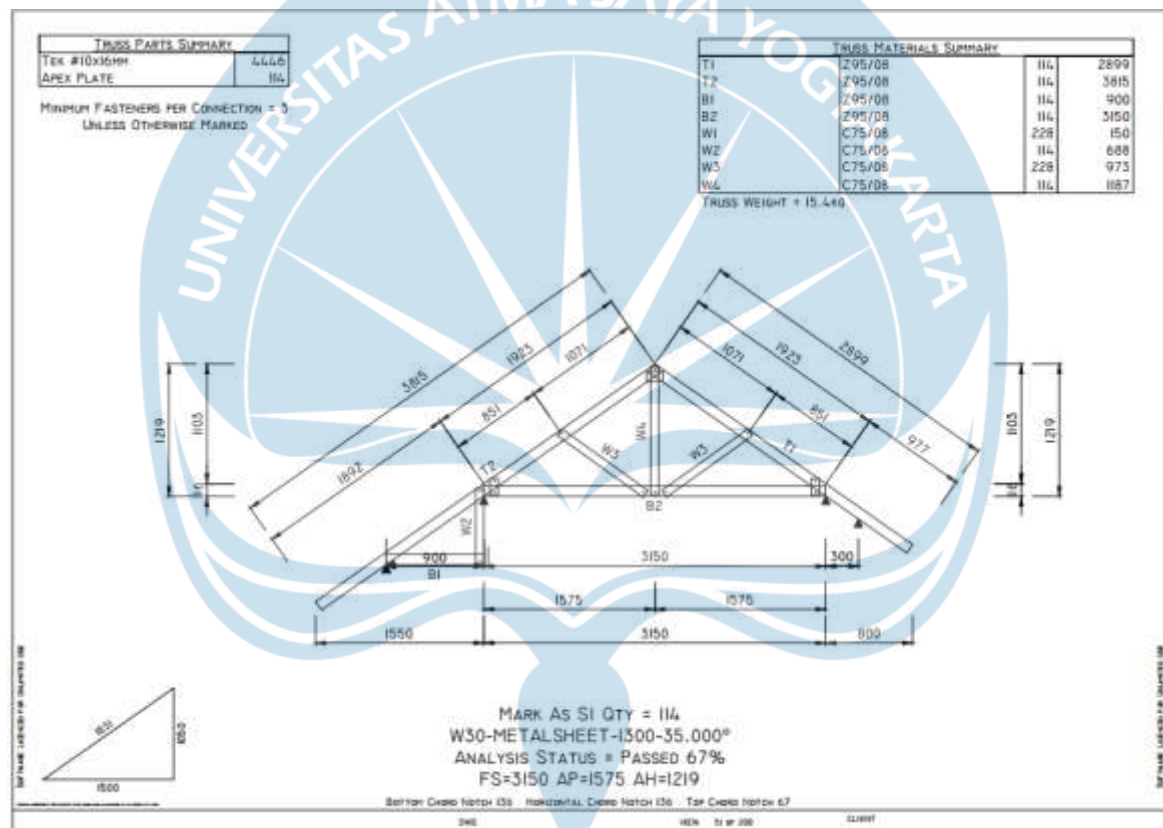
No	Profil	Dimensi nominal										Tebal nominal	Berat minimal per m ² (kg/m ²) termasuk lapisan					Aplikasi			Lebar sheet minimum (sebagai referensi/ tidak diukur) (mm)
		A	B	C	D	E	F	R (mm)	α1	α2	β1		β2	BjLS					Rangka dinding struktural	Rangka atap non struktural	
														Z18	Z22	LAS AS100	LASM K12				
1	TH25	25	16-17	8-10	6-10	2-6	2-6	0,80	65°-92°	65°-112°	0°-90°	0°-90°	0,40	0,299	-	0,292	0,291	-	-	√	90
		25	16-17	8-10	6-10	2-6	2-6	0,90	65°-92°	65°-112°	0°-90°	0°-90°	0,45	0,334	-	0,327	0,326	-	√		
		25	16-17	8-10	6-10	2-6	2-6	1,00	65°-92°	65°-112°	0°-90°	0°-90°	0,50	0,369	-	0,362	0,361	-	√		
2	TH30	30-32	15-24	10-13	10-13	3-5	3-5	0,80	65°-92°	65°-112°	0°-90°	0°-90°	0,40	0,332	-	0,324	0,323	-	-	√	100
		30-32	15-24	10-13	10-13	3-5	3-5	0,90	65°-92°	65°-112°	0°-90°	0°-90°	0,45	0,371	-	0,363	0,362	-	√		
		30-32	15-24	10-13	10-13	3-5	3-5	1,00	65°-92°	65°-112°	0°-90°	0°-90°	0,50	0,411	-	0,403	0,402	-	√		
3	TH35	33-37	15-25	11-16	11-16	1,5-8	1,5-8	0,80	65°-92°	65°-112°	0°-90°	0°-90°	0,40	0,362	-	0,373	0,371	-	-	√	115
		33-37	15-25	11-16	11-16	1,5-8	1,5-8	0,90	65°-92°	65°-112°	0°-90°	0°-90°	0,45	0,427	-	0,418	0,417	-	√		
		33-37	15-25	11-16	11-16	1,5-8	1,5-8	1,00	65°-92°	65°-112°	0°-90°	0°-90°	0,50	0,472	-	0,463	0,462	-	√		
4	TH40	37-42	23-32	12-15	12-15	2-6	2-6	0,80	75°-90°	75°-90°	0°-90°	0°-90°	0,40	0,445	-	0,434	0,433	-	-	√	134
		37-42	23-32	12-15	12-15	2-6	2-6	0,90	75°-90°	75°-90°	0°-90°	0°-90°	0,45	0,497	-	0,487	0,485	-	√		
		37-42	23-32	12-15	12-15	2-6	2-6	1,00	75°-90°	75°-90°	0°-90°	0°-90°	0,50	0,550	-	0,539	0,538	-	√		
5	TH45	43-47	20-25	15-17	3-5	3-5	0,80	0,80	65°-90°	65°-90°	0°-60°	0°-90°	0,40	0,505	-	0,492	0,491	-	-	√	152
		43-47	20-25	15-17	3-5	3-5	0,80	0,90	65°-90°	65°-90°	0°-60°	0°-90°	0,45	0,564	-	0,552	0,551	-	√		
		43-47	20-25	15-17	3-5	3-5	0,80	1,00	65°-90°	65°-90°	0°-60°	0°-90°	0,50	0,624	-	0,612	0,610	-	√		
6	TH60	58-62	36-58	13-15	13-15	2-6	2-6	1,00	75°-90°	75°-90°	0°-90°	0°-90°	0,50	0,900	-	0,785	0,783	-	√	√	195
		58-62	36-58	13-15	13-15	2-6	2-6	1,20	75°-90°	75°-90°	0°-90°	0°-90°	0,60	-	0,923	0,938	0,936	-	√	√	
		58-62	36-58	13-15	13-15	2-6	2-6	1,30	75°-90°	75°-90°	0°-90°	0°-90°	0,65	-	0,999	1,014	1,013	-	√	√	
		58-62	36-58	13-15	13-15	2-6	2-6	1,40	75°-90°	75°-90°	0°-90°	0°-90°	0,70	-	1,076	1,091	1,089	√	-	√	
		58-62	36-58	13-15	13-15	2-6	2-6	1,50	75°-90°	75°-90°	0°-90°	0°-90°	0,75	-	1,152	1,168	1,168	√	-	√	



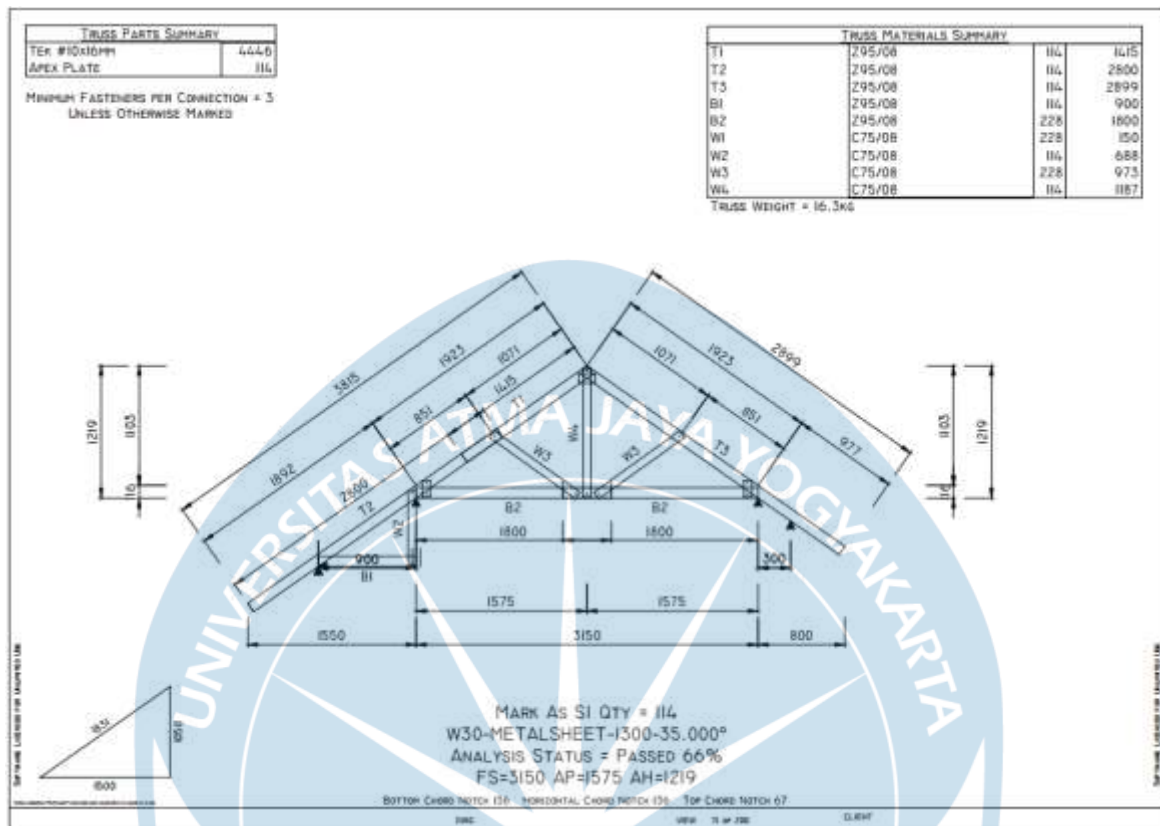
Lampiran 4 : Hasil Minimasi Limbah Proyek P1

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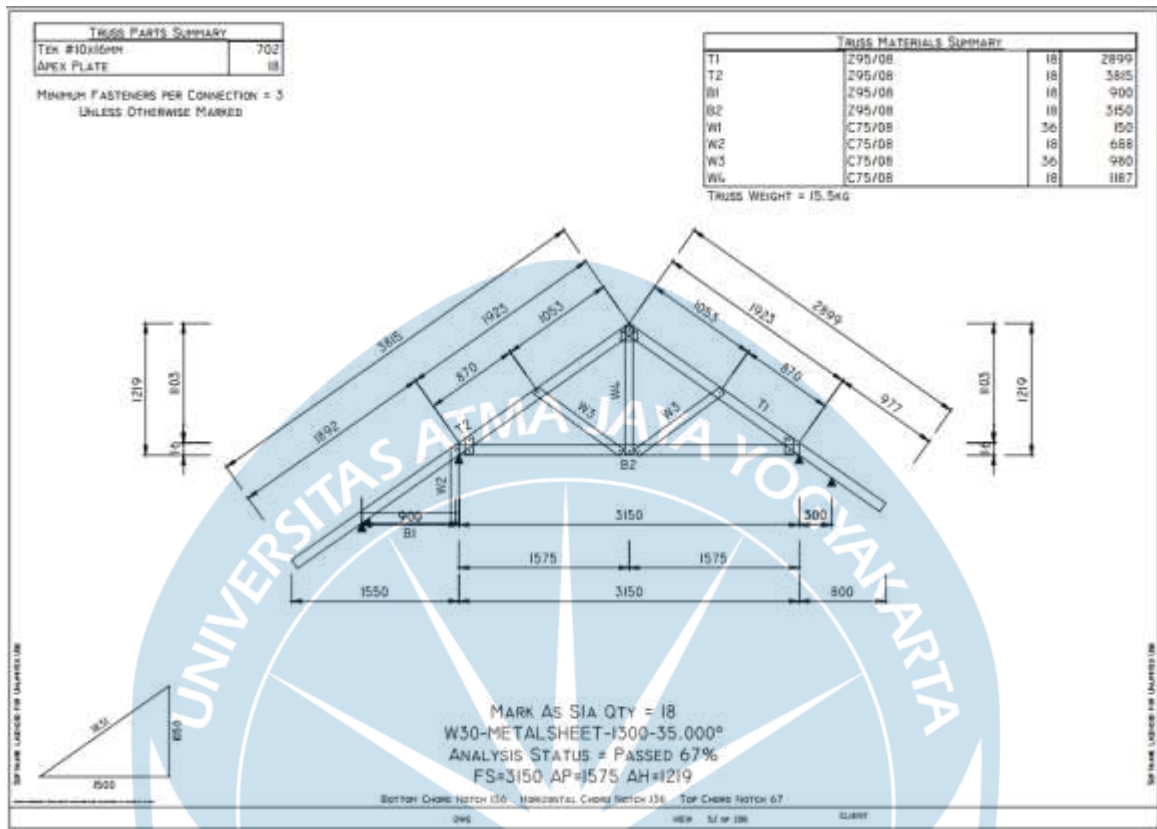
Lampiran 4. Hasil Minimasi Limbah Proyek P1



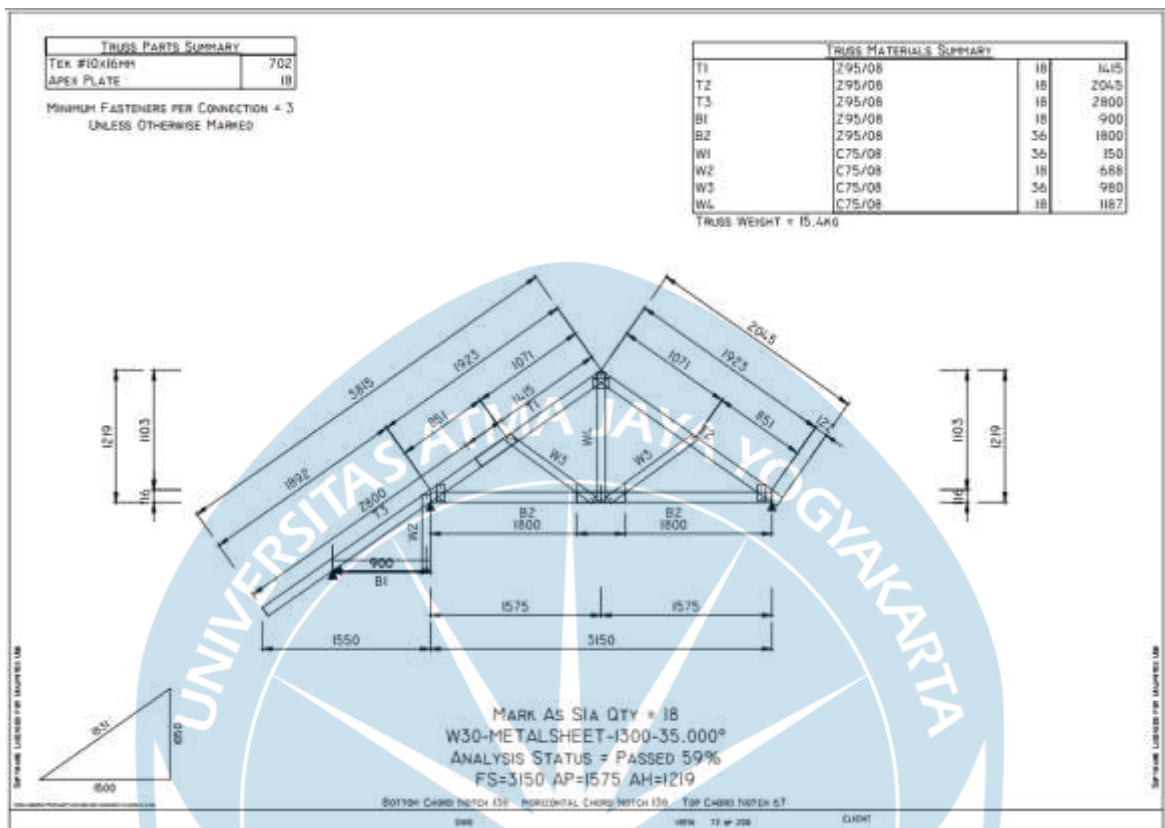
Potongan Kuda-kuda S1 Awal



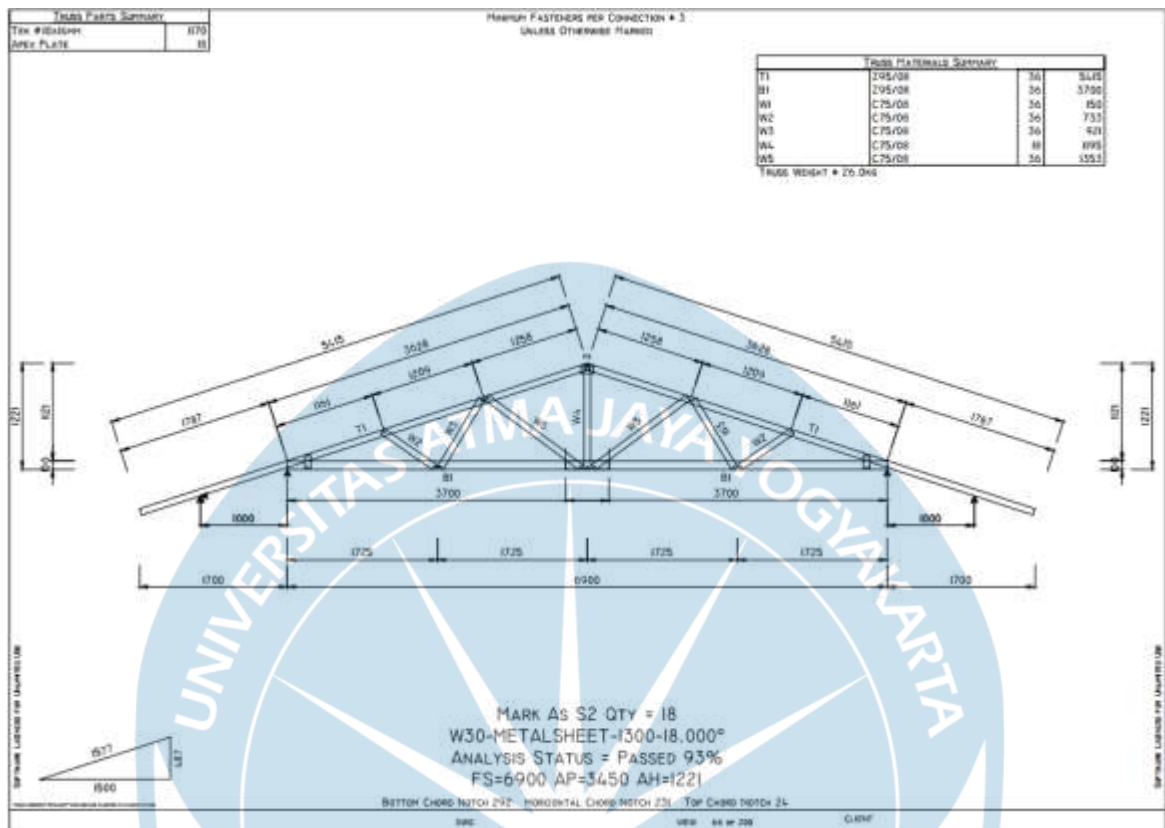
Potongan Kuda-kuda S1 Kombinasi *Cutting List* Baru



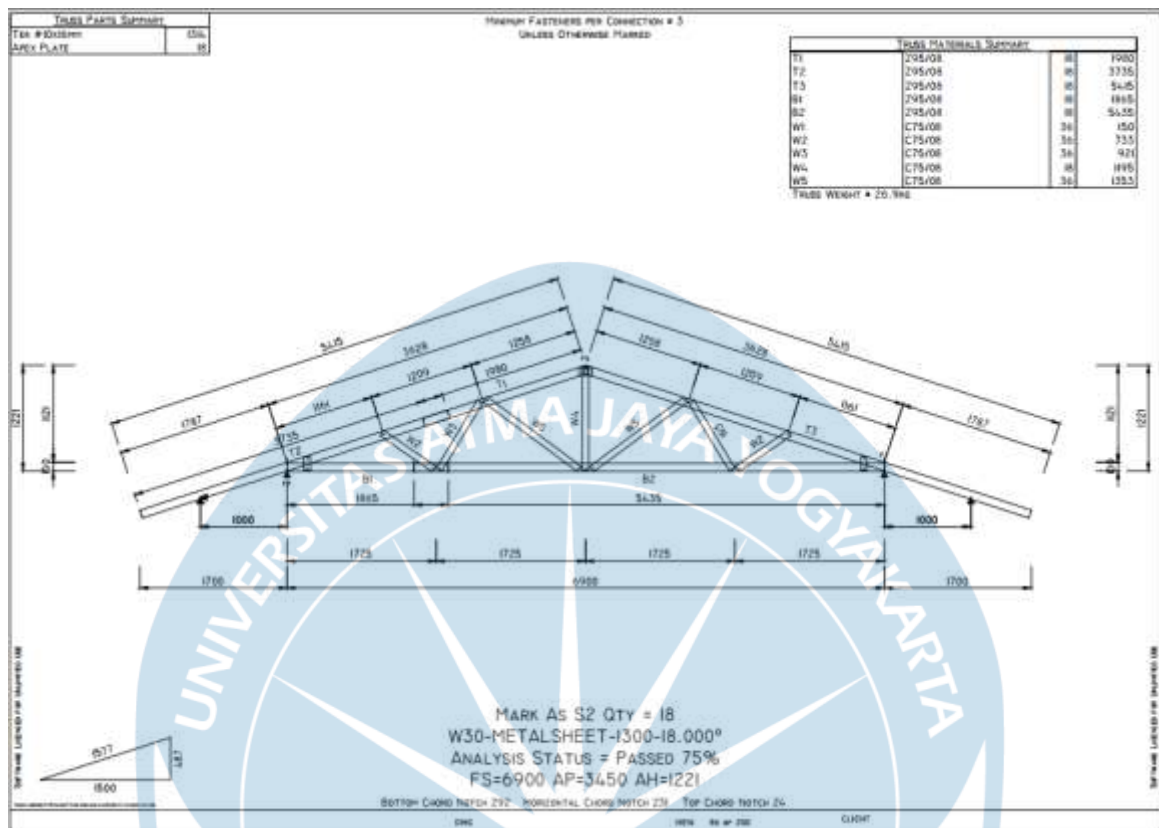
Potongan Kuda-Kuda S1a Awal



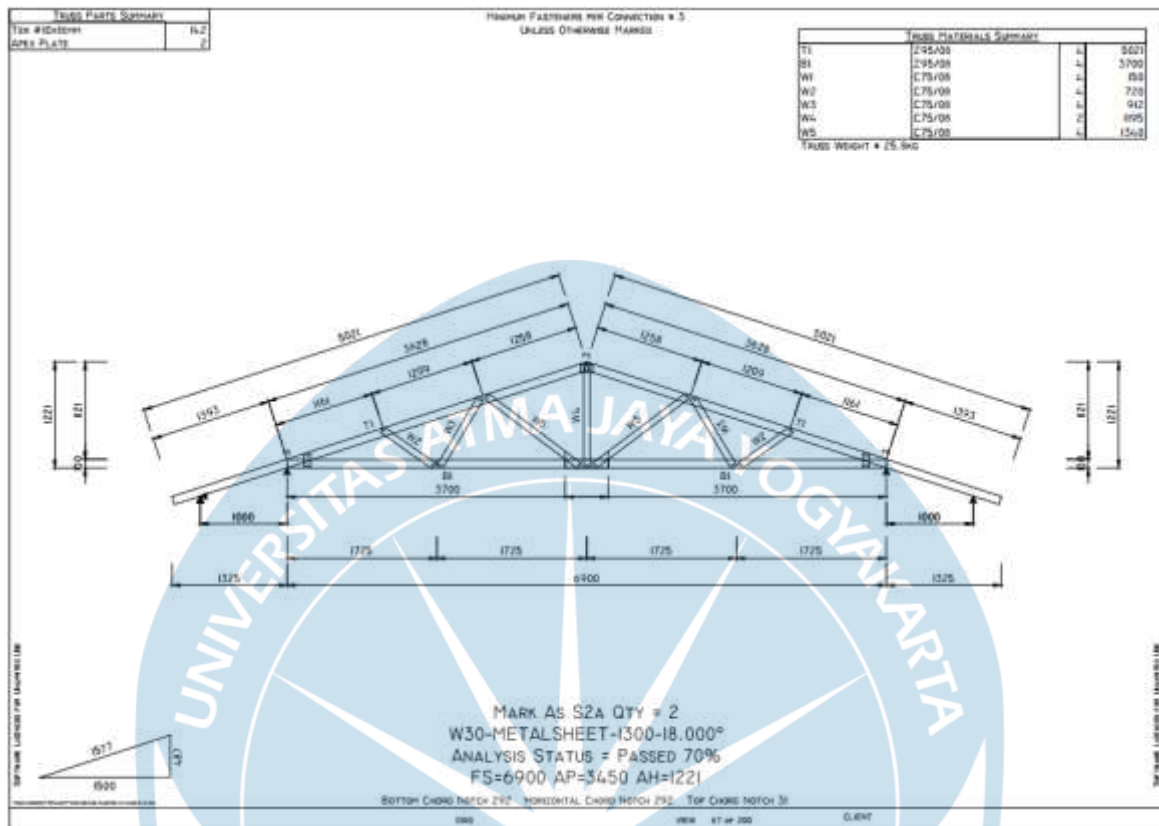
Potongan Kuda-kuda S1a Kombinasi *Cutting List* Baru



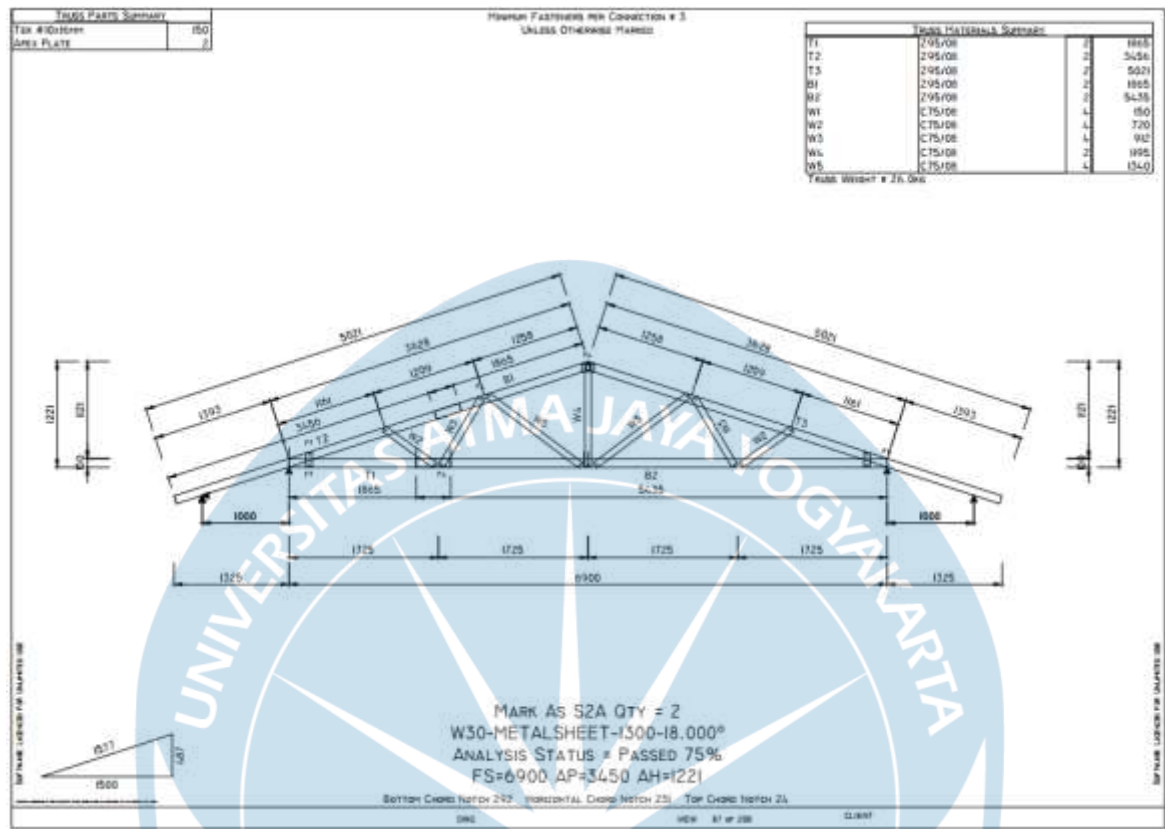
Potongan Kuda-kuda S2 Awal



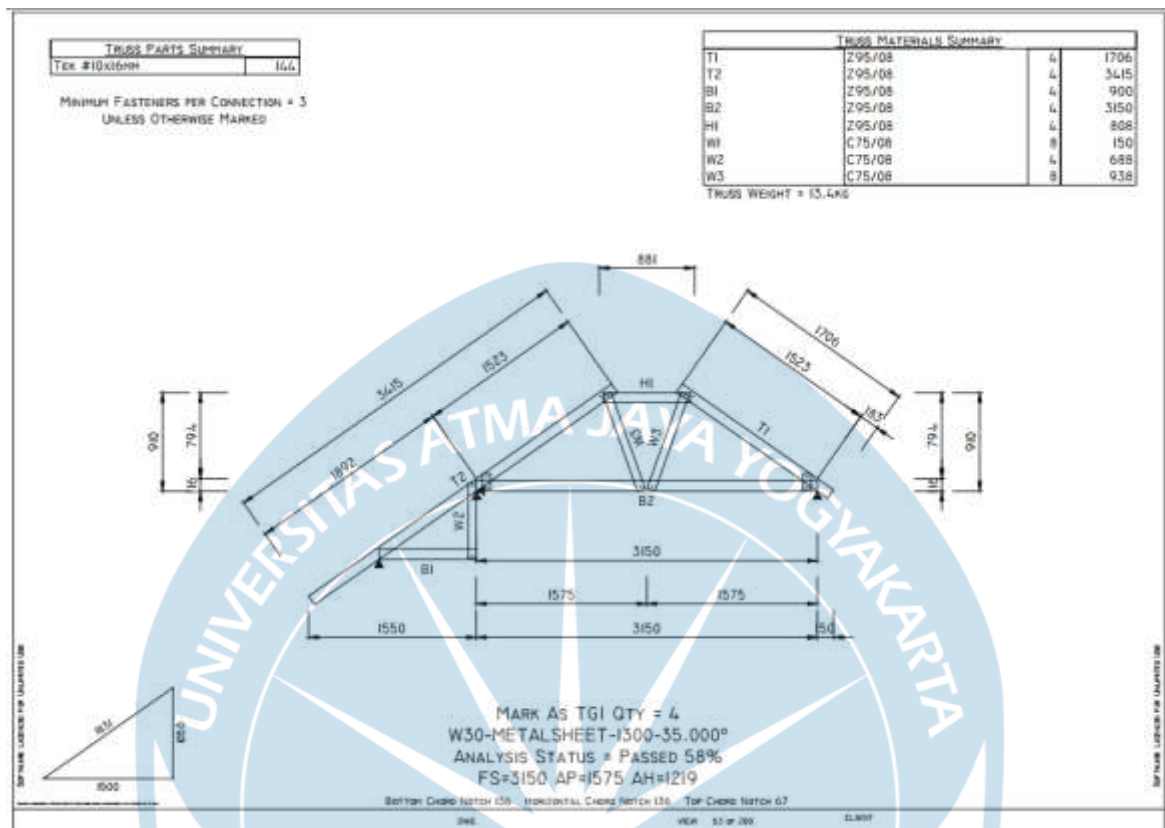
Potongan Kuda-kuda S2 Kombinasi *Cutting List* Baru



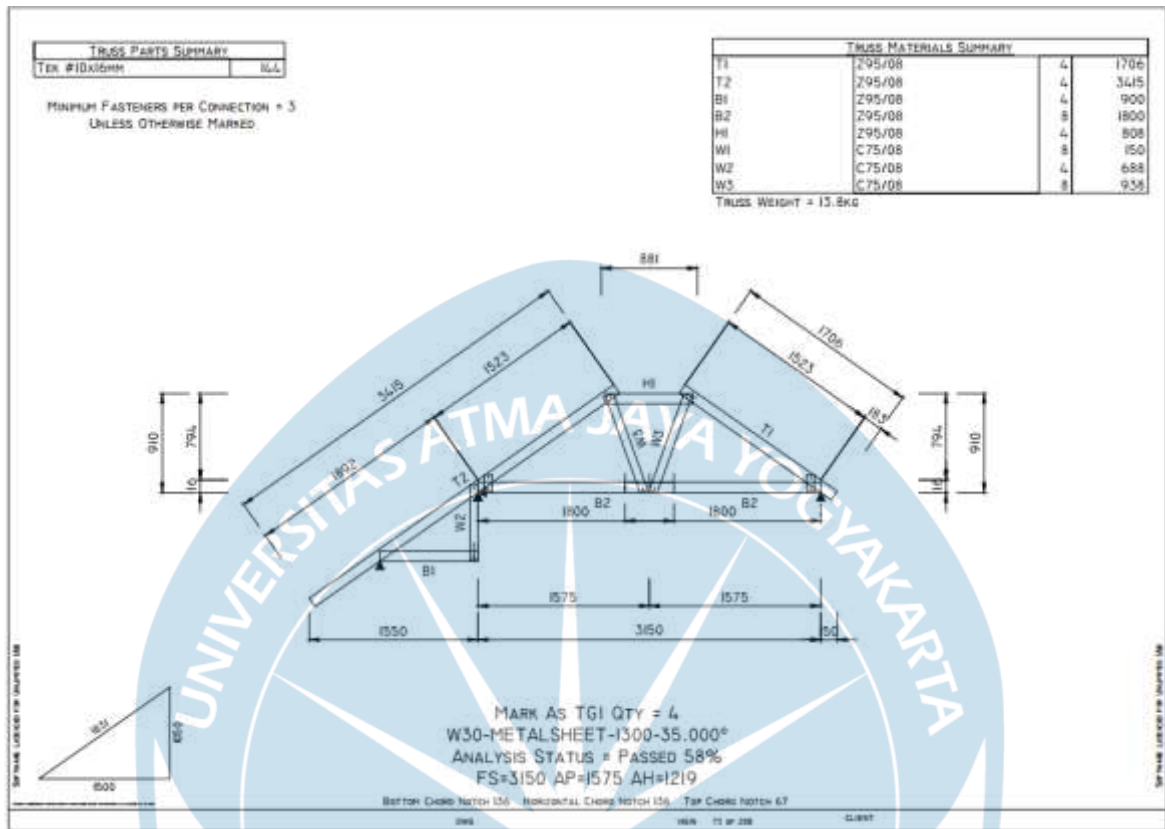
Potongan Kuda-kuda S2a Awal



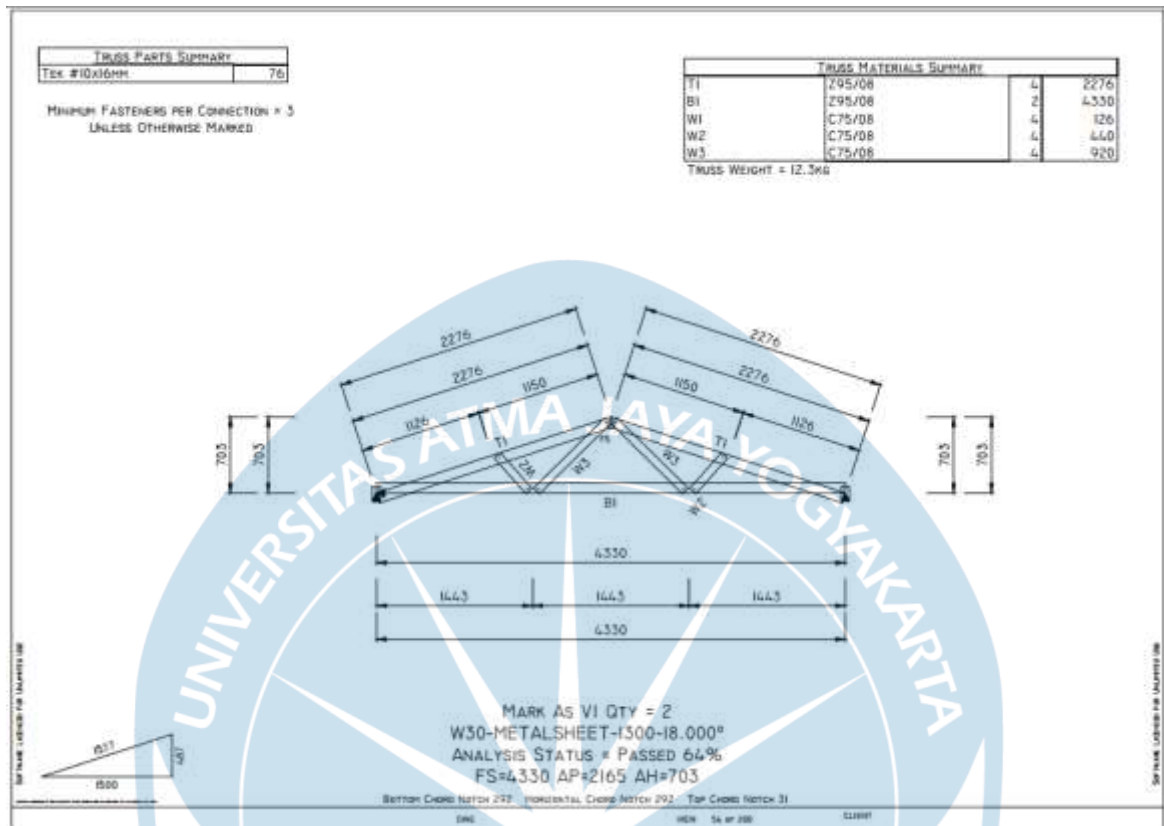
Potongan Kuda-kuda S2a Kombinasi *Cutting List* Baru



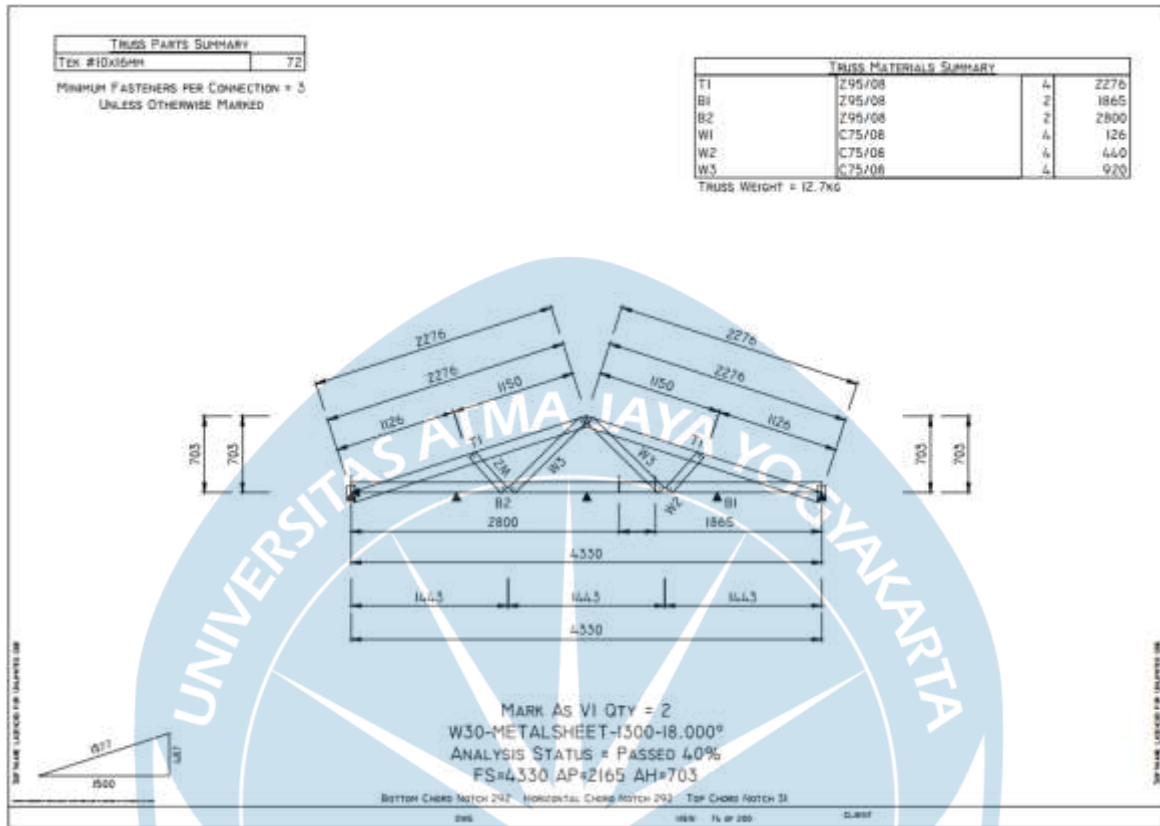
Potongan Kuda-kuda TG1 Awal



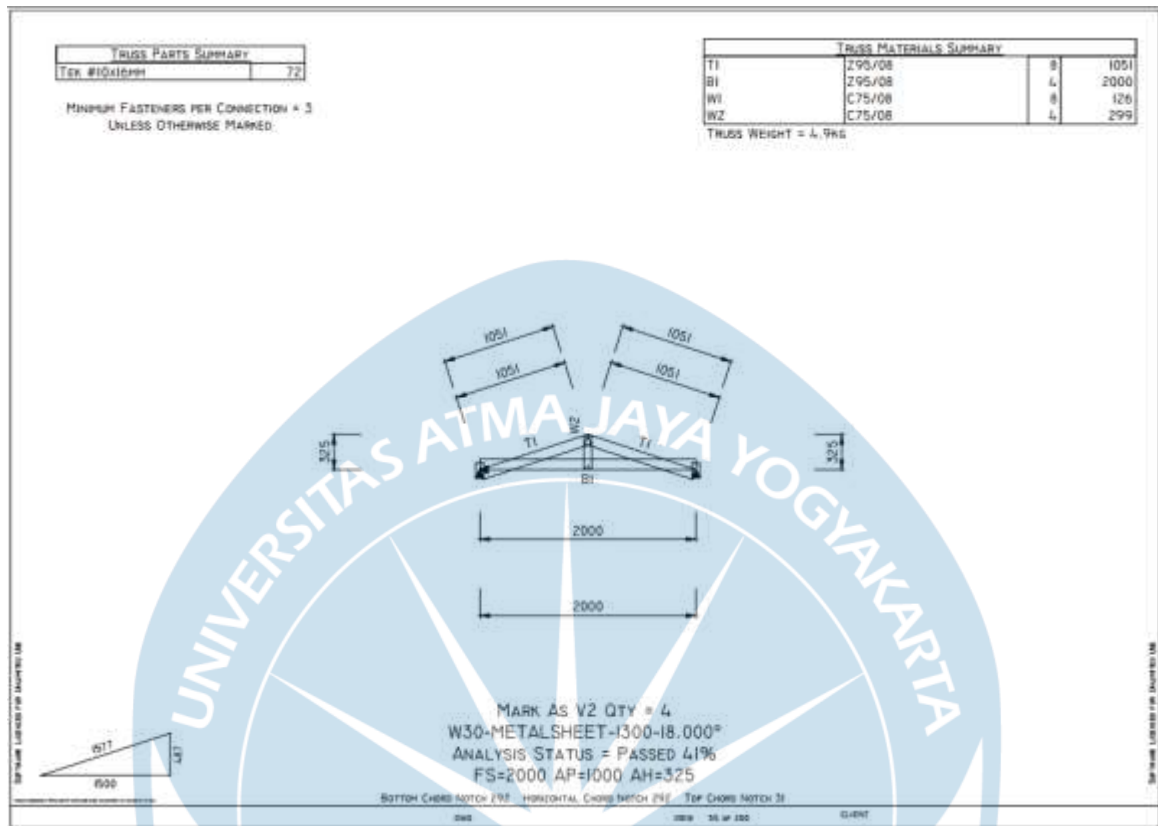
Potongan Kuda-kuda TG1 Kombinasi *Cutting List* Baru



Potongan Kuda-kuda V1 Awal



Potongan Kuda-kuda V1 Kombinasi *Cutting List* Baru



Potongan Kuda-kuda V2

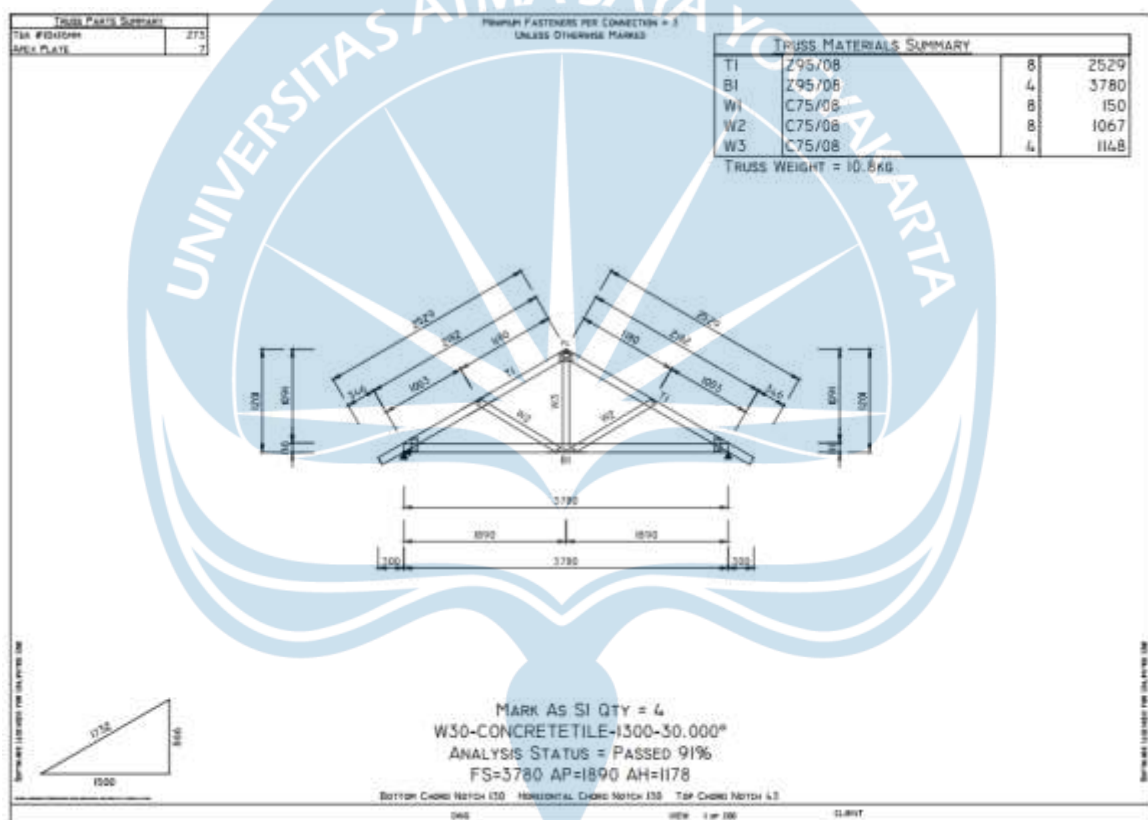


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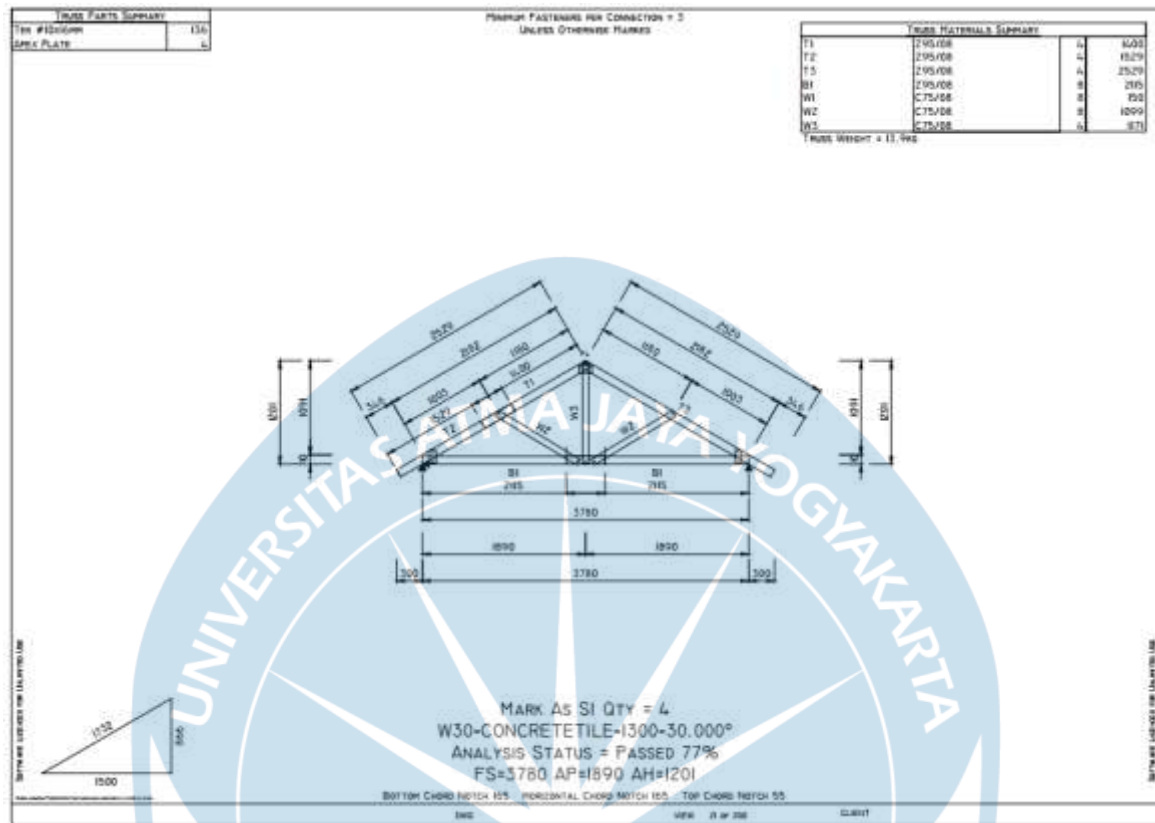
Hasil Minimasi Limbah Proyek P2

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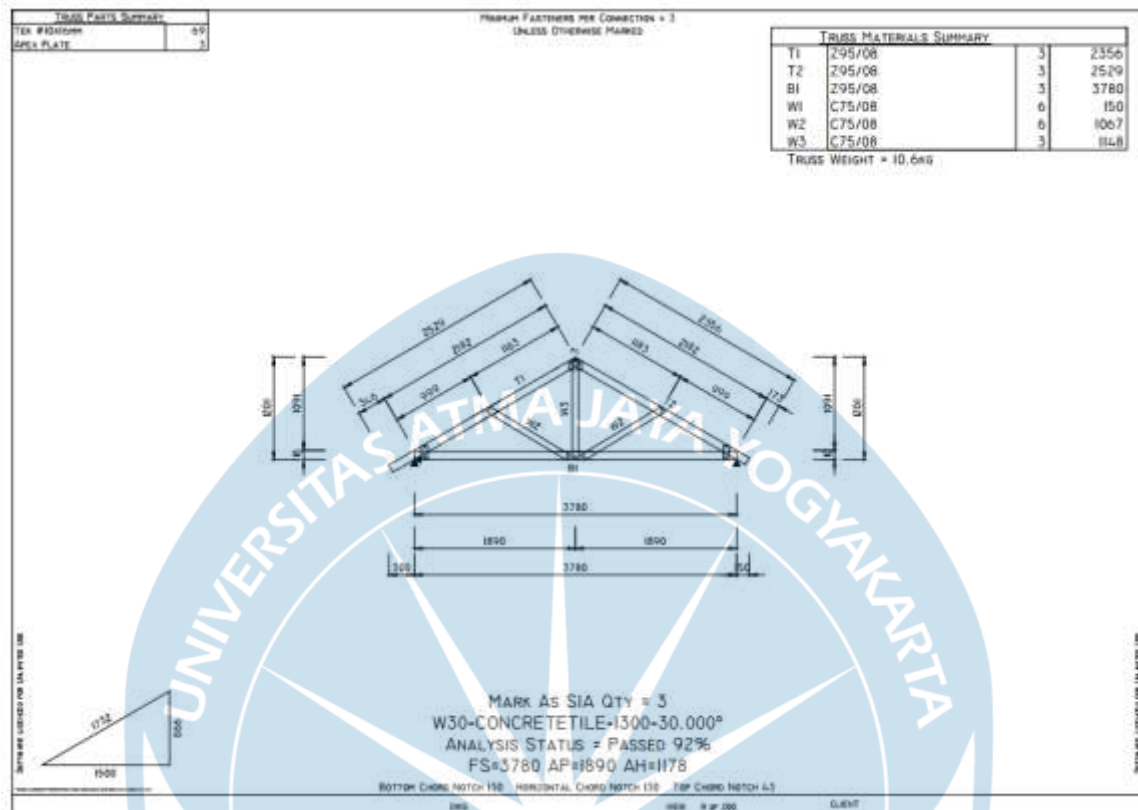
Lampiran 5. Hasil Minimasi Limbah Proyek P2



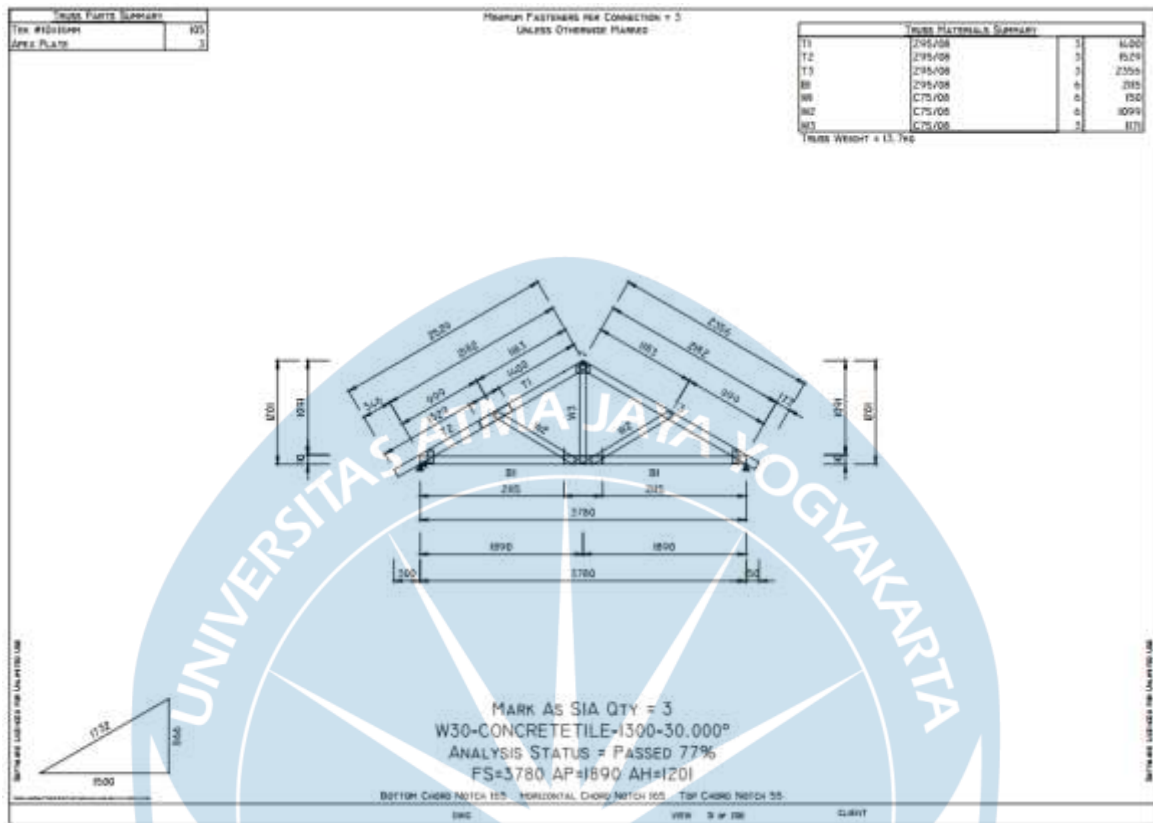
Potongan Kuda-kuda S1 Awal



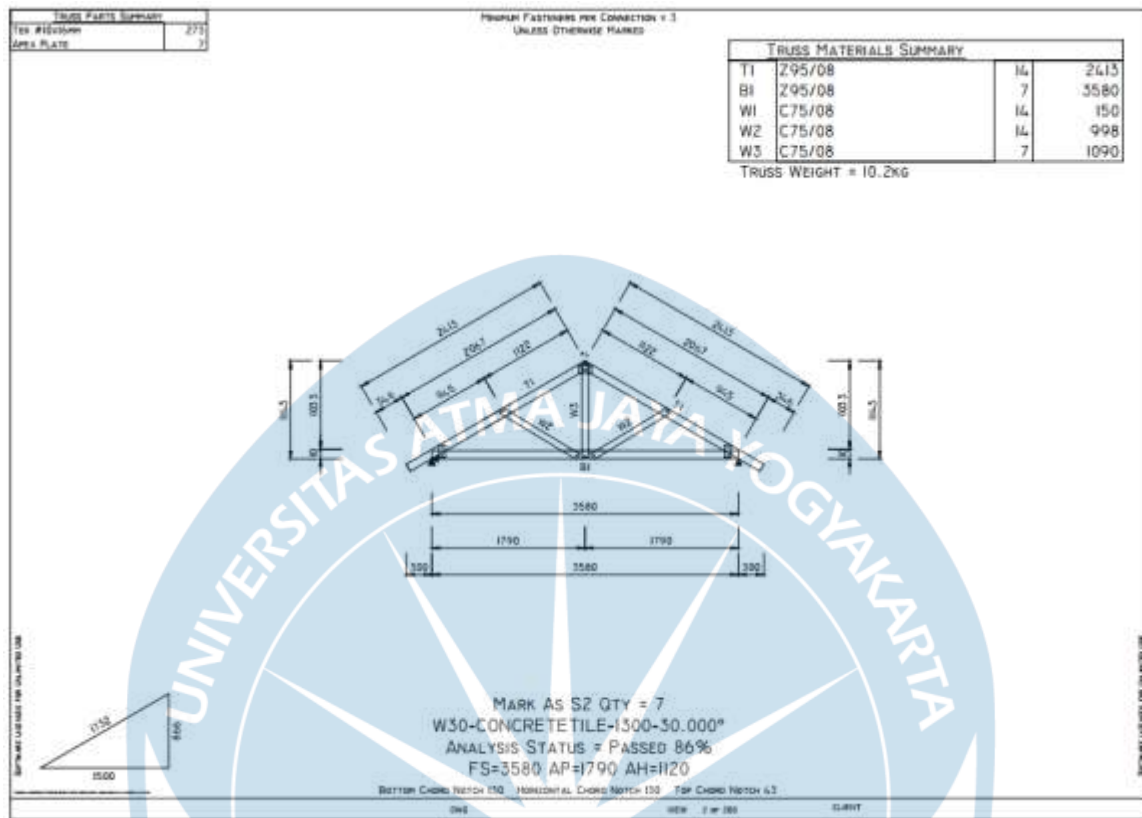
Potongan Kuda-kuda S1 Kombinasi *Cutting List* Baru



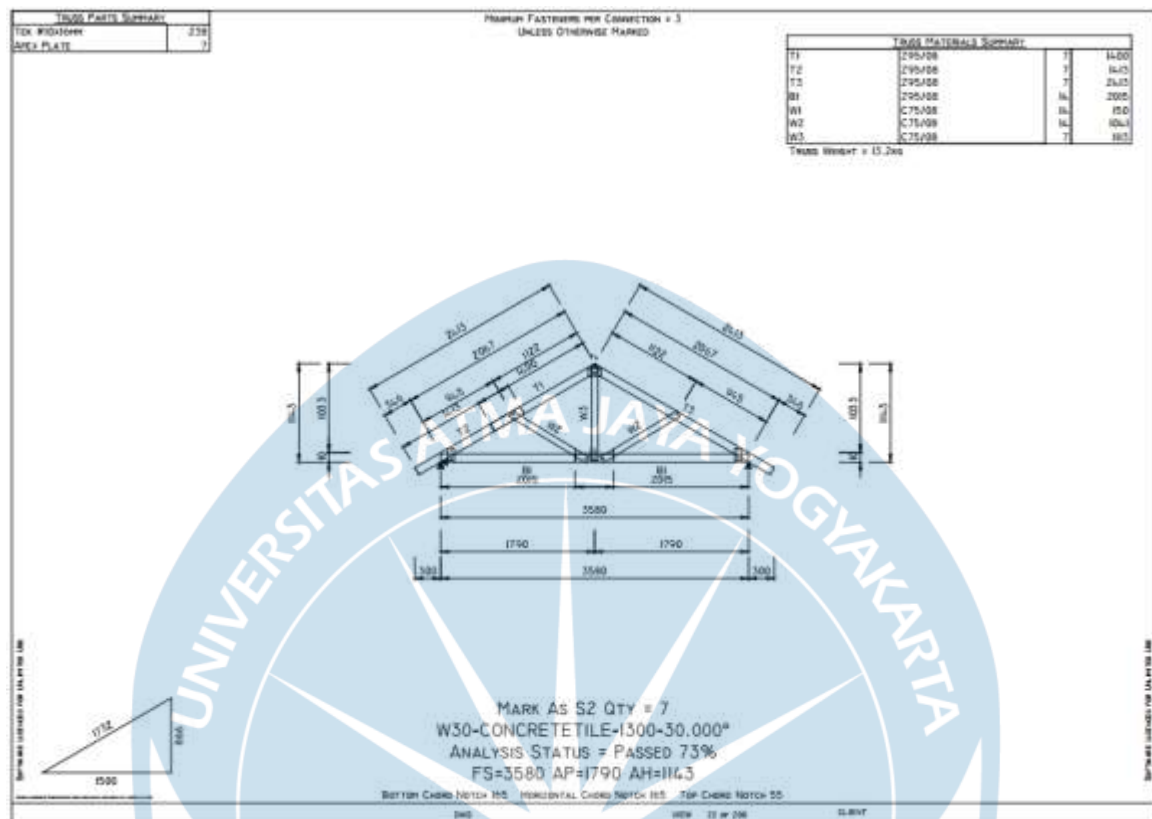
Potongan Kuda-kuda S1a Awal



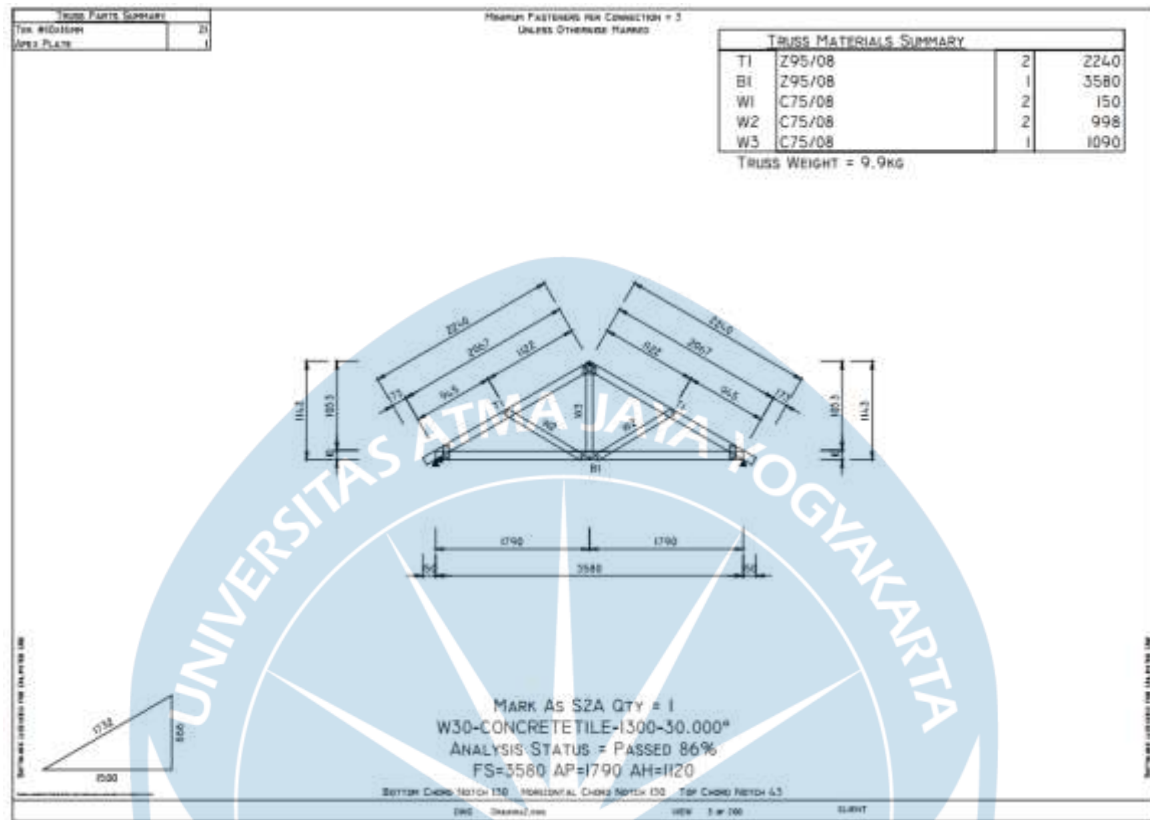
Potongan Kuda-kuda S1a Kombinasi *Cutting List* Baru



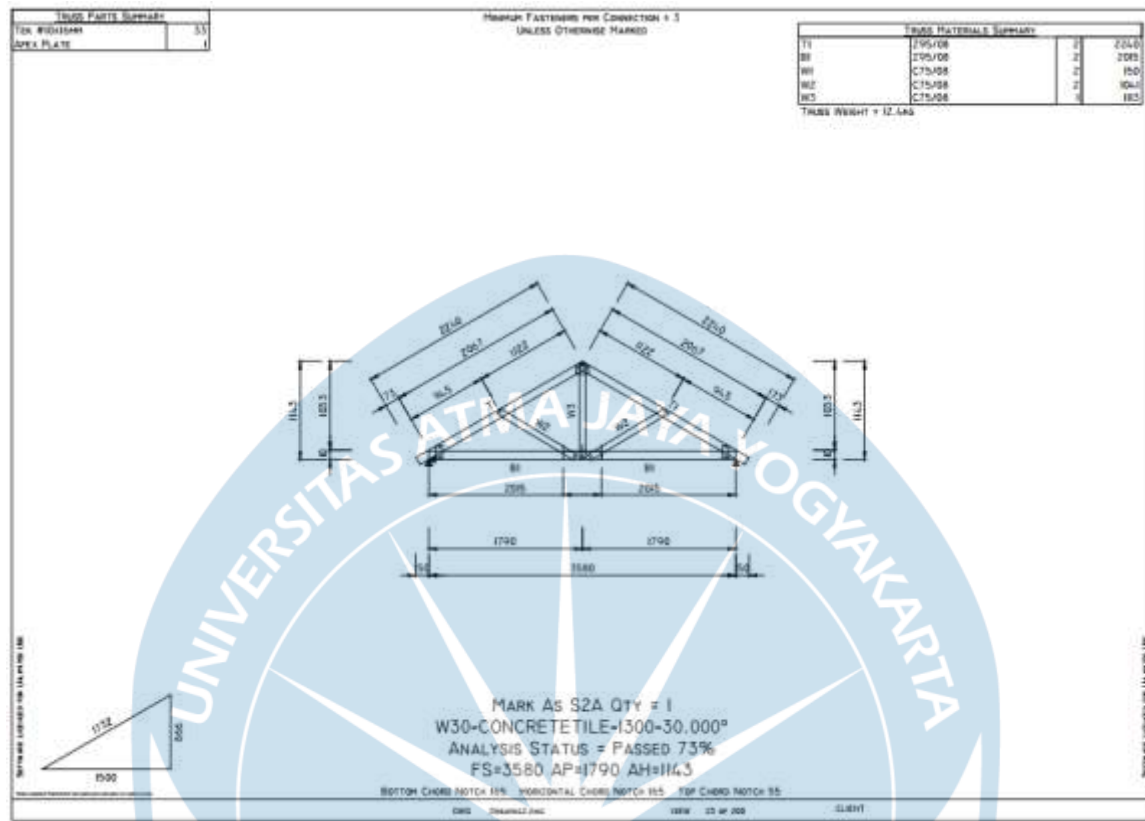
Potongan Kuda-kuda S2 Awal



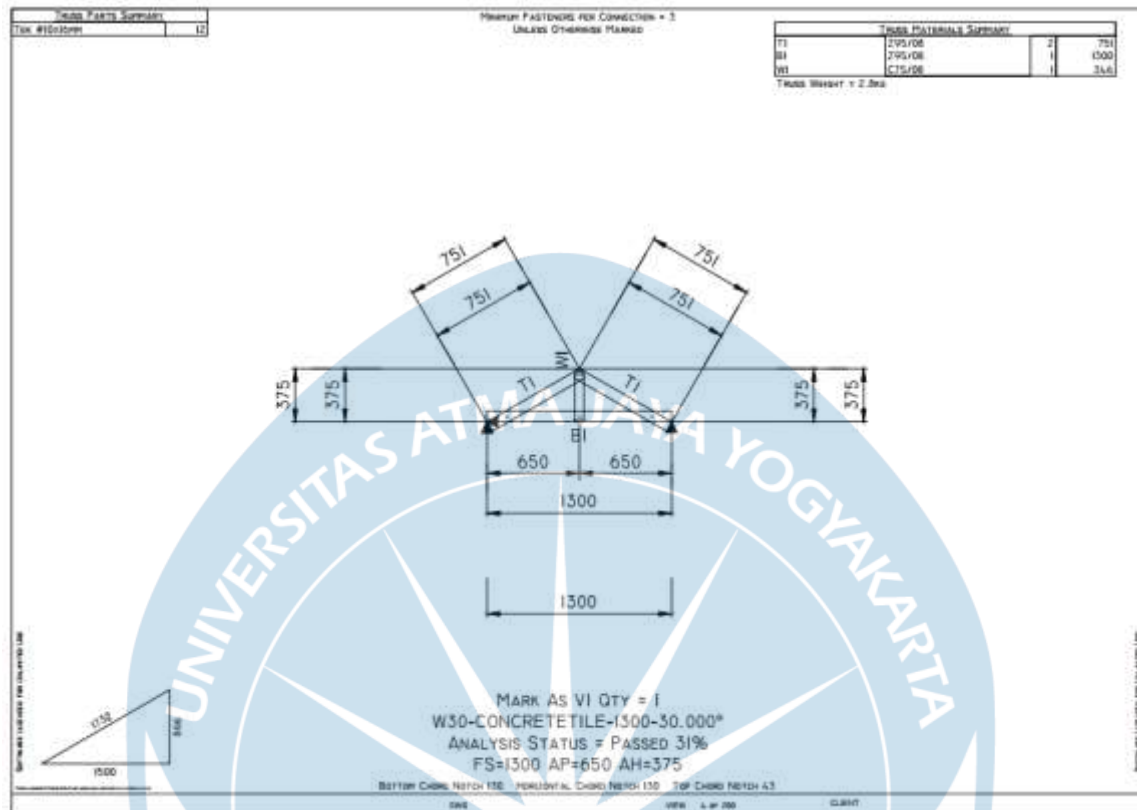
Potongan Kuda-kuda S2 Kombinasi *Cutting List* Baru



Potongan Kuda-kuda S2a Awal



Potongan Kuda-kuda S2a Kombinasi *Cutting List* Baru



Potongan Kuda-kuda V1

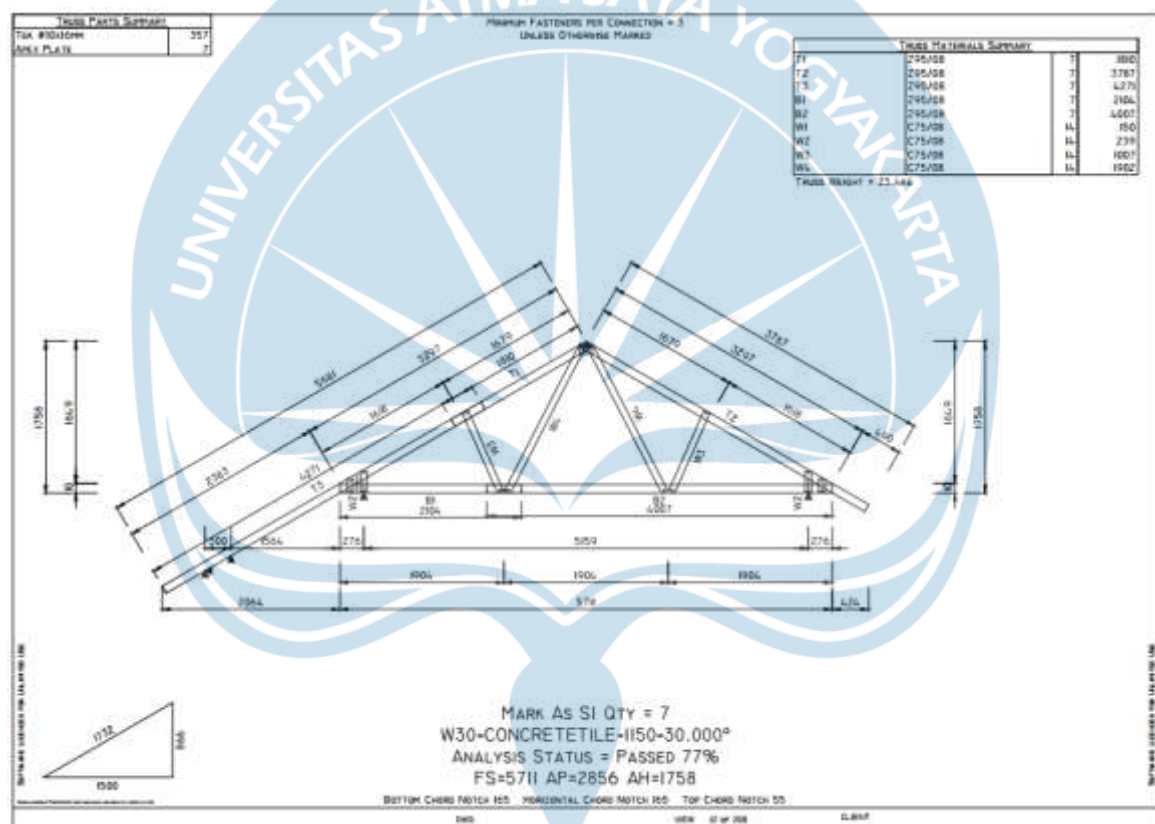


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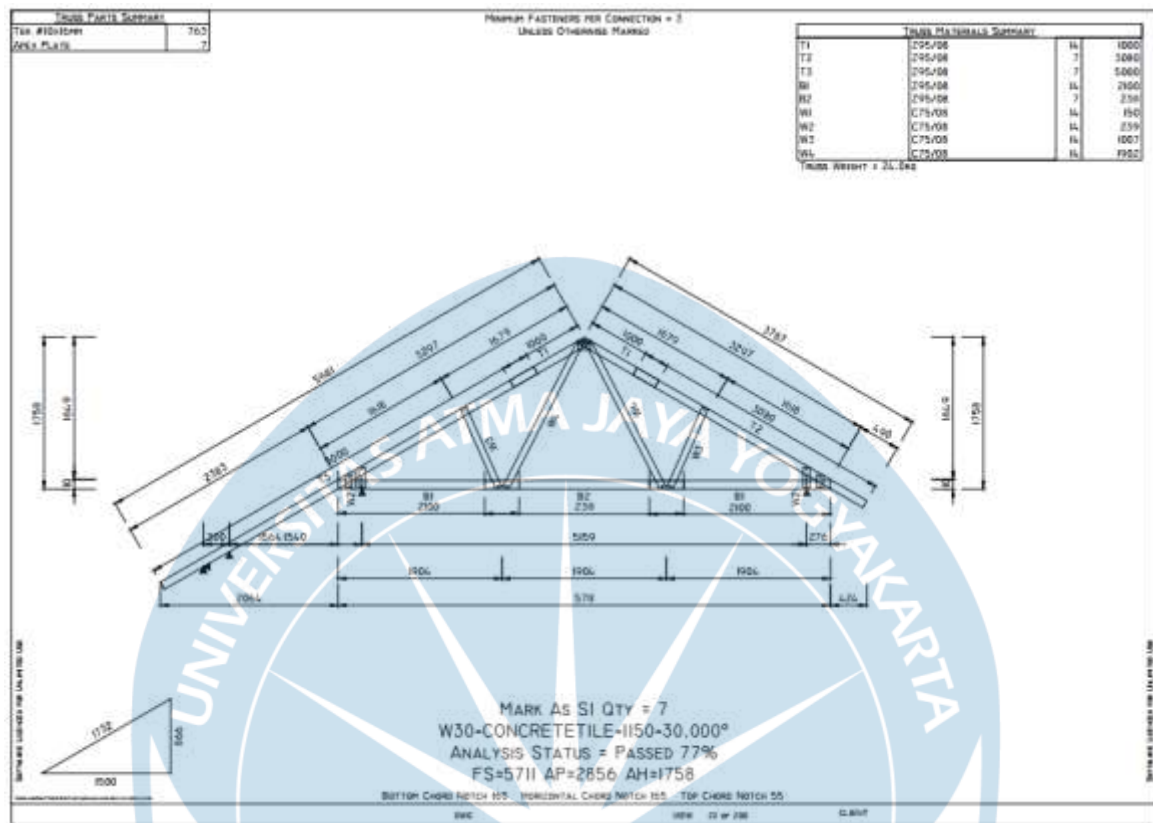
Hasil Minimasi Limbah Proyek P3

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Lampiran 6 . Hasil Minimasi Limbah Proyek P3



Potongan Kuda-kuda S1 Awal



Potongan Kuda-kuda S1 Kombinasi *Cutting List* Baru