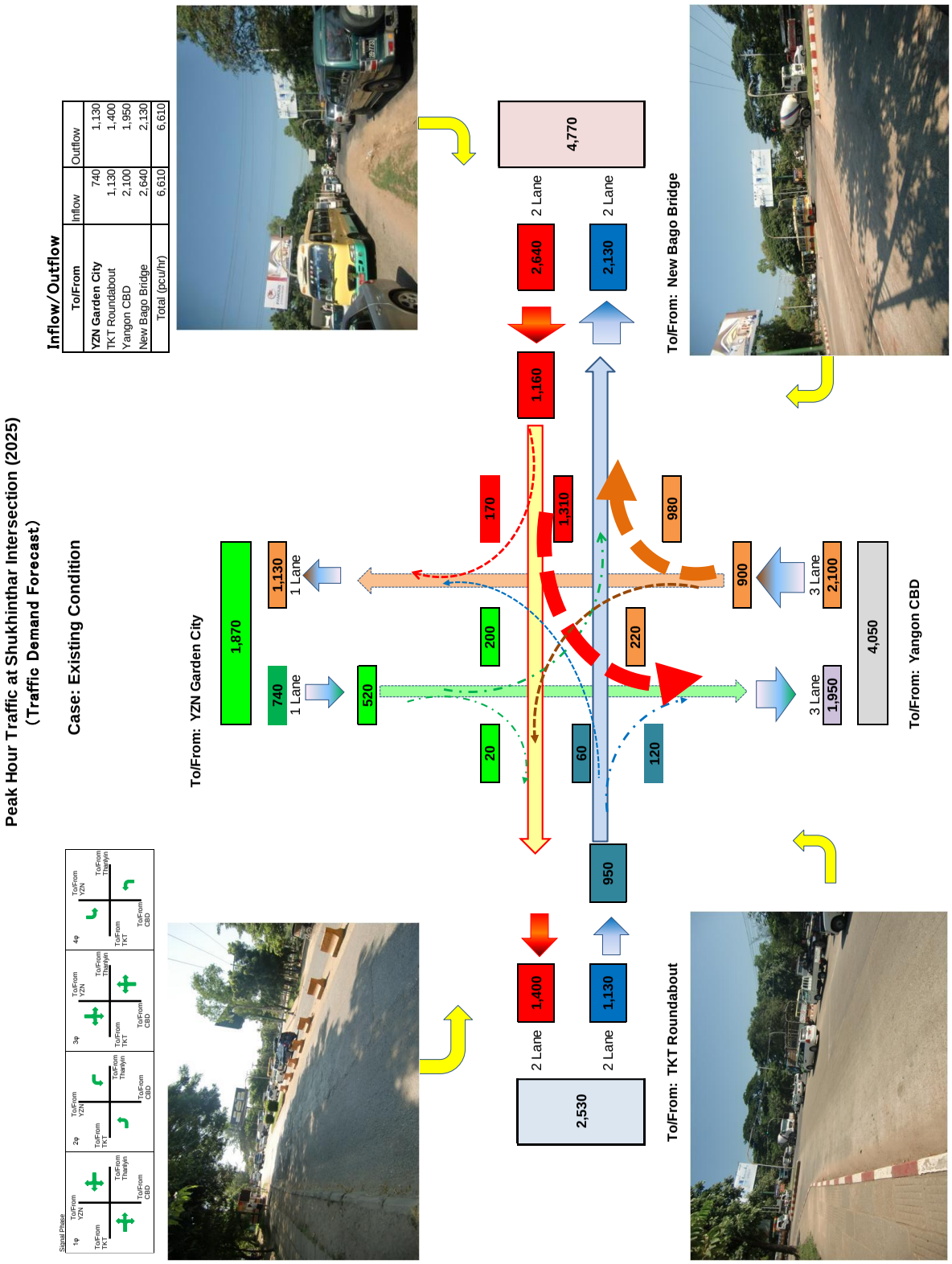
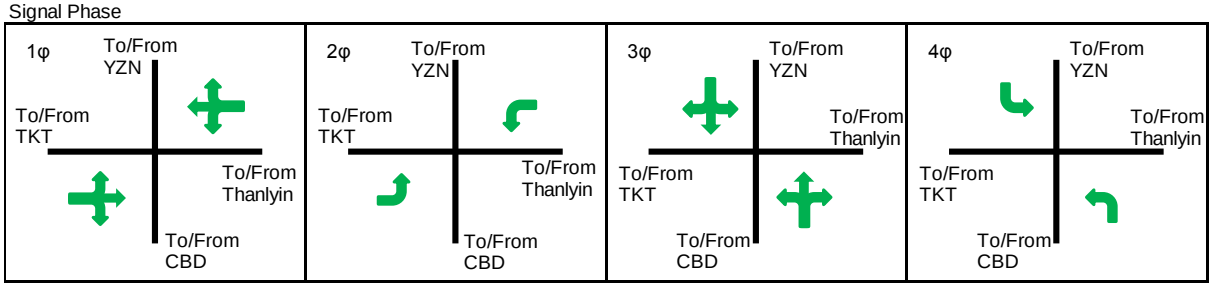
Appendix C Results of Intersection Analysis

Appendix C-1: Case of Existing Condition at Shukhinthar Intersection in 2025



Source: JICA Study Team

Signal Phase



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Shukhinthar Intersection

Case: 2025 Existing Condition

Entry		Thanlyin to TKT		YZN to CBD		TKT to Thanlyin		CBD to YZN		
Direction		LT	TH + RT	LT	TH + RT	LT	TH + RT	LT	TH	RT
Number of Lane: a		1	1	1	1	1	1	1	1	1
Basic value of saturation flow rate (PCU/hr): b		1,800	2,000	1,800	2,000	1,800	2,000	1,800	2,000	1,800
Reduction coefficient: c (Lane width: m)		1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)			0.986 (12.8)		0.996 (3.7)		0.988 (11.2)			
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h		2(72)		2(72)		2(72)		2(72)		
Saturation flow ratio: i=a*b*c*d*e*f*g		1,800	1,972	1,800	1,992	1,800	1,976	1,800	2,000	1,800
Traffic volume (pcu/hr): V		1,310	1,330 (170+1160)	200	540 (20+520)	60	1,070 (120+950)	220	900	980
Traffic volume with compensation of left turn (pcu/hr): V'=V-h		1,238		128		0		148		
Flow ratio: j=V/i or j=V'/i		0.688	0.674	0.071	0.271	0.000	0.541	0.082	0.450	0.544
Current cycle length (sec): k		100								
Phase ratio	1φ		0.674				0.541			
	2φ	0.688				0.000				
	3φ				0.271				0.450	0.544
	4φ			0.071				0.082		
Demand ratio of intersection *		1.988								
Current green time (sec): l	1φ		30				30			
	2φ	29				29				
	3φ				24				24	24
	4φ			5				5		
Capacity (pcu/hr): C=i*l/k or C=i*l/k+h*3600/k		594	592	162	478	594	593	162	480	432
Degree of Saturation: V/C **		2.205	2.247	1.235	1.130	0.101	1.804	1.358	1.875	2.269
Check		NG	NG	NG	NG	OK	NG	NG	NG	NG

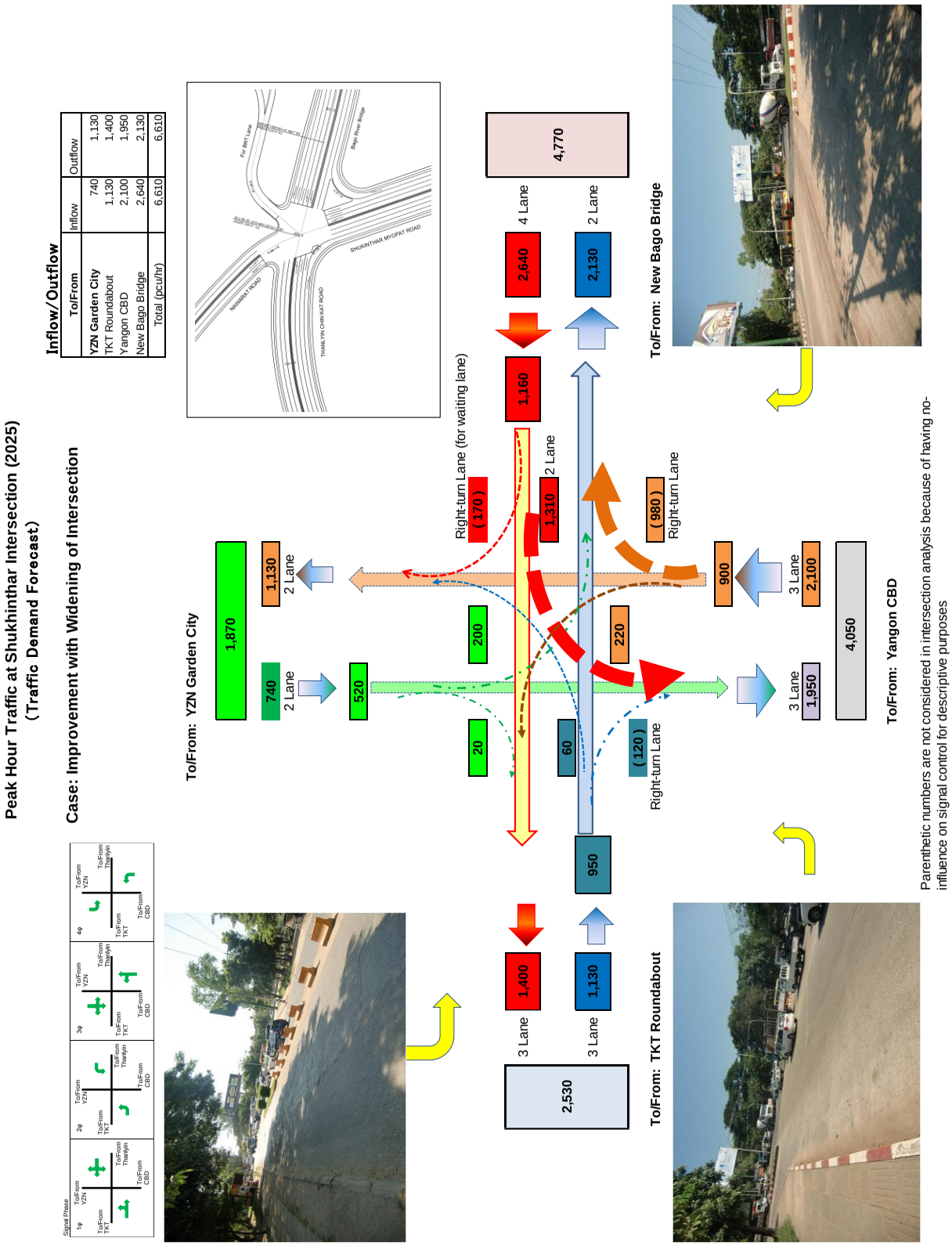
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

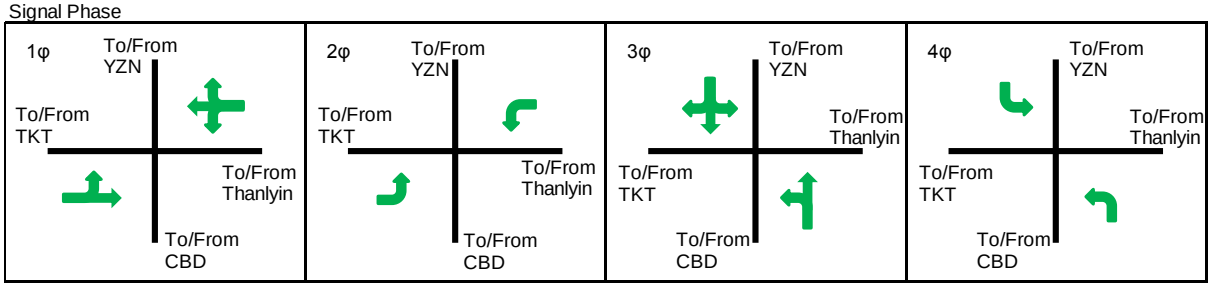
Source: JICA Study Team

Appendix C-2: Case of Improvement with Widening of Intersection at Shukhinthar Intersection in 2025



Source: JICA Study Team

Signal Phase



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Shukhinthar Intersection

Case: 2025 Improvement with Widening of Intersection

Entry		Thanlyin to TKT			YZN to CBD		TKT to Thanlyin		CBD to YZN	
Direction		LT	TH	RT	LT	TH +RT	LT	TH	LT	TH
Number of Lane: a		2	2	1	1	1	1	2	1	2
Basic value of saturation flow rate (PCU/hr): b		1,800	2,000	1,800	1,800	2,000	1,800	2,000	1,800	2,000
Reduction coefficient: c (Lane width: m)		1.000 (3.00)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)						0.996 (3.7)				
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h		2(72)			2(72)		2(72)		2(72)	
Saturation flow ratio: i=a*b*c*d*e*f*g		3,600	4,000	1,800	1,800	1,992	1,800	4,000	1,800	4,000
Traffic volume (pcu/hr): V		1,310	1,160	170	200	540 (20+520)	60	950	220	900
Traffic volume with compensation of left turn (pcu/hr): V'=V-h		1,238			128		0		148	
Flow ratio: j=V/i or j=V'/i		0.344	0.290	0.094	0.071	0.271	0.000	0.237	0.082	0.225
Current cycle length (sec): k		100								
Phase ratio	1φ		0.290	0.094				0.237		
	2φ	0.344					0.000			
	3φ					0.271				0.225
	4φ				0.071				0.082	
Demand ratio of intersection *		0.987								
Current green time (sec): l	1φ		26	26				26		
	2φ	31					31			
	3φ					24				24
	4φ				7				7	
Capacity (pcu/hr): C=i*l/k or C=i*l/k+h*3600/k		1,188	1,040	468	198	478	630	1,040	198	960
Degree of Saturation: V/C **		1.103	1.115	0.363	1.010	1.130	0.095	0.913	1.111	0.938
Check		NG	NG	OK	NG	NG	OK	OK	NG	OK

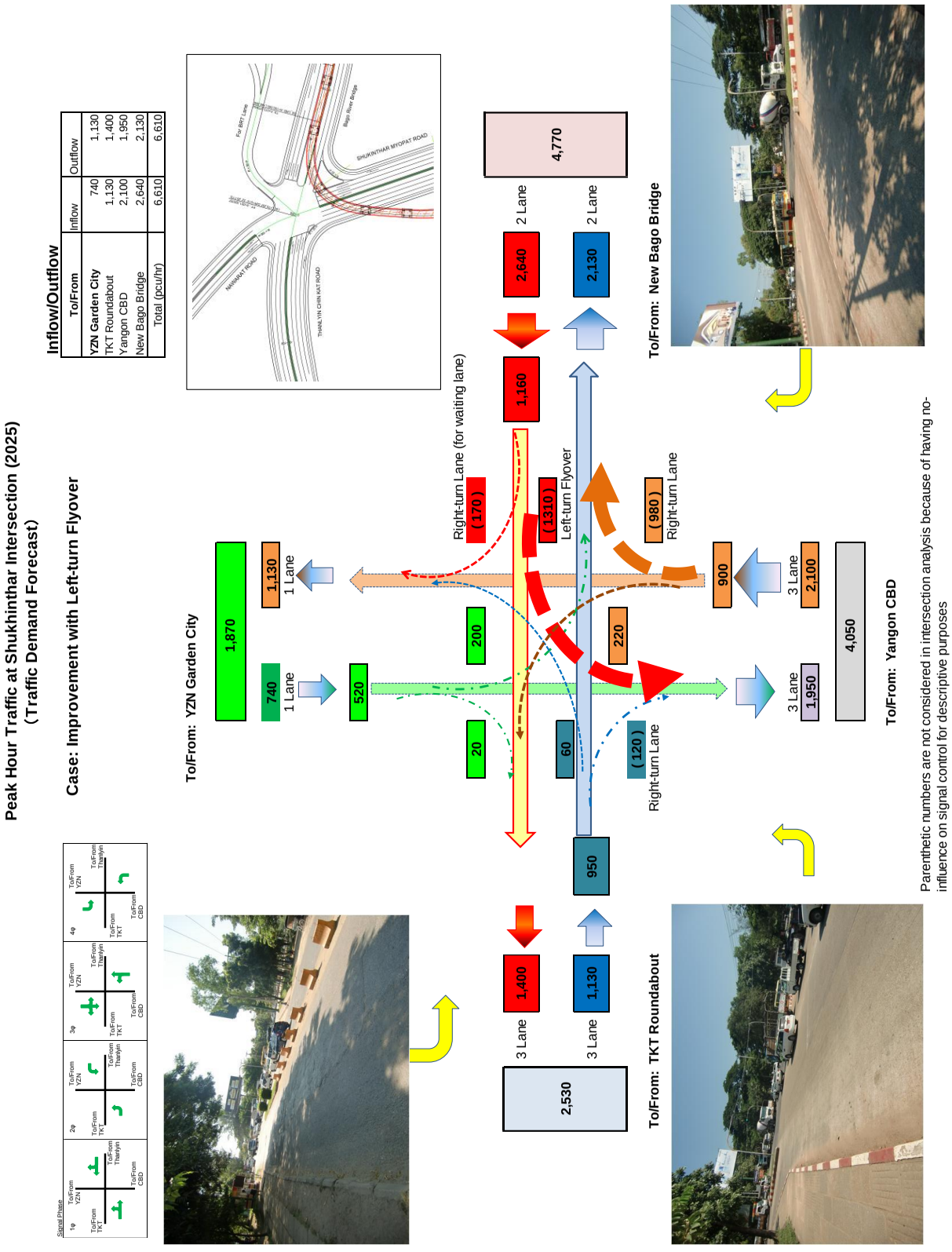
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

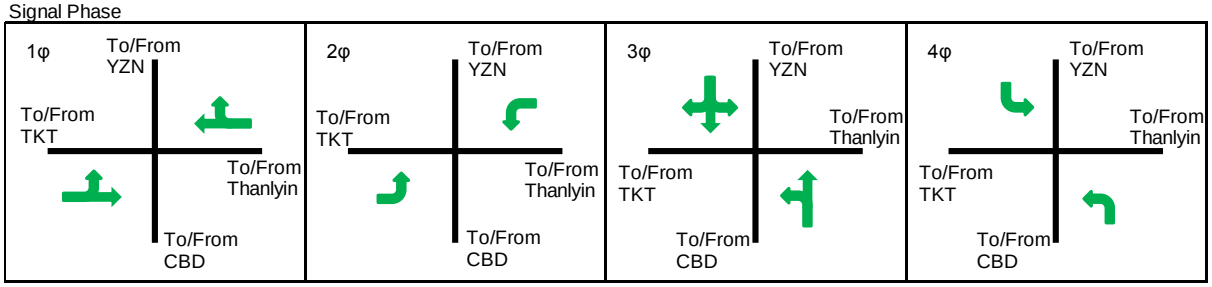
Source: JICA Study Team

Appendix C-3: Case of Improvement with Left-turn Flyover at Shukhinthar Intersection in 2025



Source: JICA Study Team

Signal Phase



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Shukhinthar Intersection

Case: 2025 Improvement with Left-turn Flyover

Entry		Thanlyin to TKT		YZN to CBD		TKT to Thanlyin		CBD to YZN	
Direction		TH	RT	LT	TH+RT	LT	TH	LT	TH
Number of Lane: a		2	1	1	1	1	2	1	2
Basic value of saturation flow rate (PCU/hr): b		2,000	1,800	1,800	2,000	1,800	2,000	1,800	2,000
Reduction coefficient: c (Lane width: m)		1.000 (3.00)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)					0.996 (3.7)				
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h				2(72)		2(72)		2(72)	
Saturation flow ratio: i=a*b*c*d*e*f*g		4,000	1,800	1,800	1,992	1,800	4,000	1,800	4,000
Traffic volume (pcu/hr): V		1,160	170	200	540 (20+520)	60	950	220	900
Traffic volume with compensation of left turn (pcu/hr): V'=V-h				128		0		148	
Flow ratio: j=V/i or j=V'/i		0.290	0.094	0.071	0.271	0.000	0.237	0.082	0.225
Current cycle length (sec): k		100							
Phase ratio	1φ	0.290	0.094				0.237		
	2φ					0.000			
	3φ				0.271				0.225
	4φ			0.071				0.082	
Demand ratio of intersection *		0.643							
Current green time (sec): l	1φ	37	37				37		
	2φ					5			
	3φ				34				34
	4φ			12				12	
Capacity (pcu/hr): C=i*l/k or C=i*l/k+h*3600/k		1,480	666	288	677	162	1,480	288	1,360
Degree of Saturation: V/C **		0.784	0.255	0.694	0.798	0.370	0.642	0.764	0.662
Check		OK	OK	OK	OK	OK	OK	OK	OK

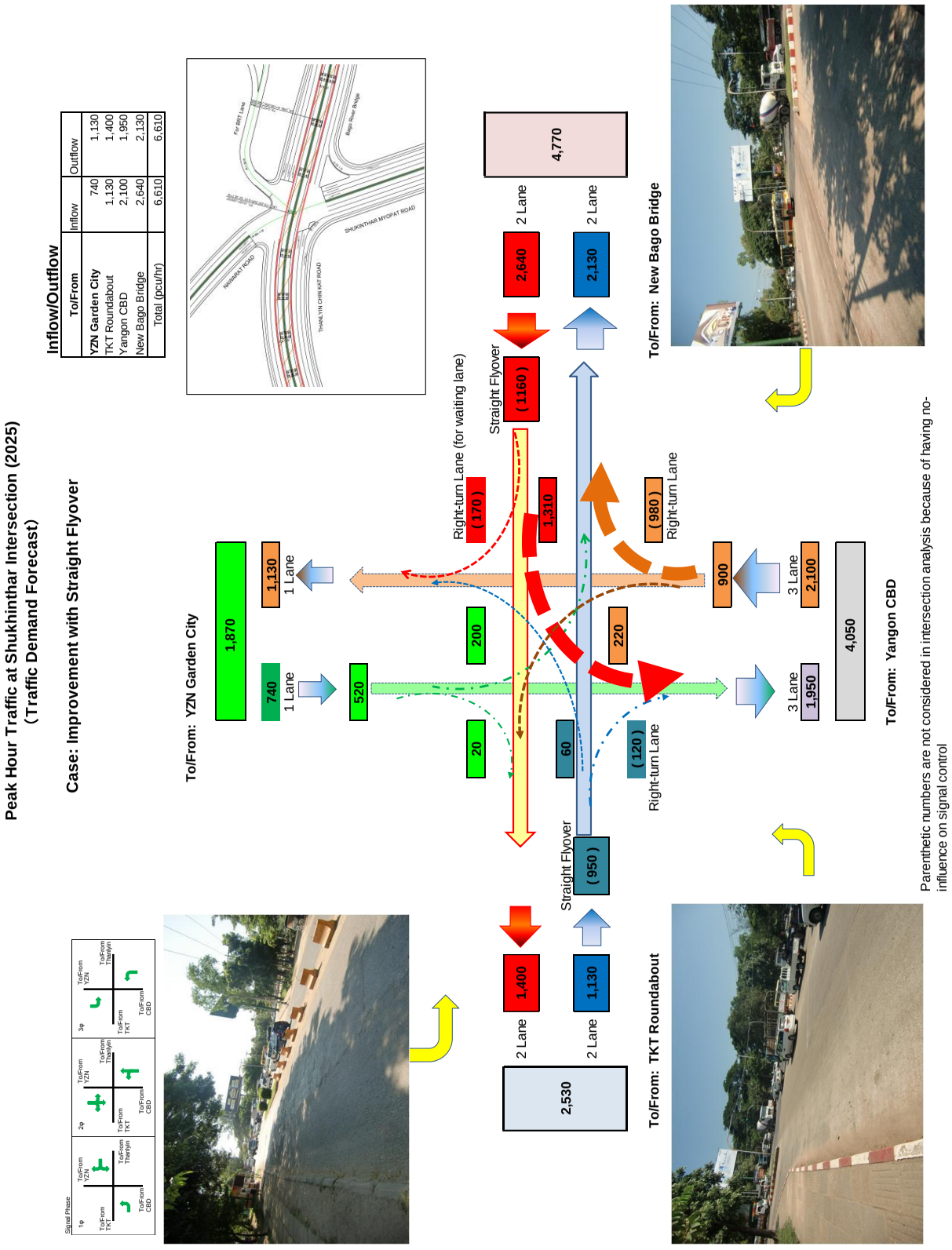
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

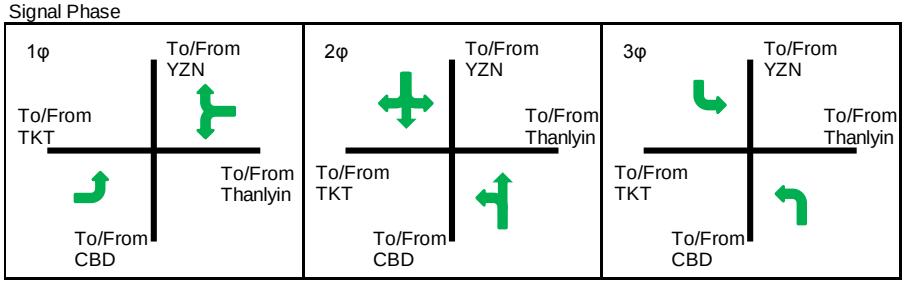
Source: JICA Study Team

Appendix C-4: Case of Improvement with Straight Flyover at Shukhinthar Intersection in 2025



Source: JICA Study Team

Signal Phase



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Shukhinthar Intersection

Case: 2025 Improvement with Straight Flyover

Entry		Thanlyin to TKT		YZN to CBD		TKT to Thanlyin	CBD to YZN	
Direction		LT	RT	LT	TH+RT	LT	LT	TH
Number of Lane: a		2	1	1	1	2	1	2
Basic value of saturation flow rate (PCU/hr): b		1,800	1,800	1,800	2,000	1,800	1,800	2,000
Reduction coefficient: c (Lane width: m)		1.000 (3.00)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)					0.996 (3.7)			
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h				2(72)			2(72)	
Saturation flow ratio: i=a*b*c*d*e*f*g		3,600	1,800	1,800	1,992	3,600	1,800	4,000
Traffic volume (pcu/hr): V		1,310	170	200	540 (20+520)	60	220	900
Traffic volume with compensation of left turn (pcu/hr): V'=V-h				128			148	
Flow ratio: j=V/i or j=V'/i		0.364	0.094	0.071	0.271	0.017	0.082	0.225
Current cycle length (sec): k		100						
Phase ratio	1φ	0.364	0.094			0.017		
	2φ				0.271			0.225
	3φ			0.071			0.082	
Demand ratio of intersection *		0.717						
Current green time (sec): l	1φ	45	45			45		
	2φ				34			34
	3φ			11			11	
Capacity (pcu/hr): C=i*l/k or i*l/k+h*3600/k		1,620	810	270	677	1,620	270	1,360
Degree of Saturation: V/C **		0.809	0.210	0.741	0.798	0.037	0.815	0.662
Check		OK	OK	OK	OK	OK	OK	OK

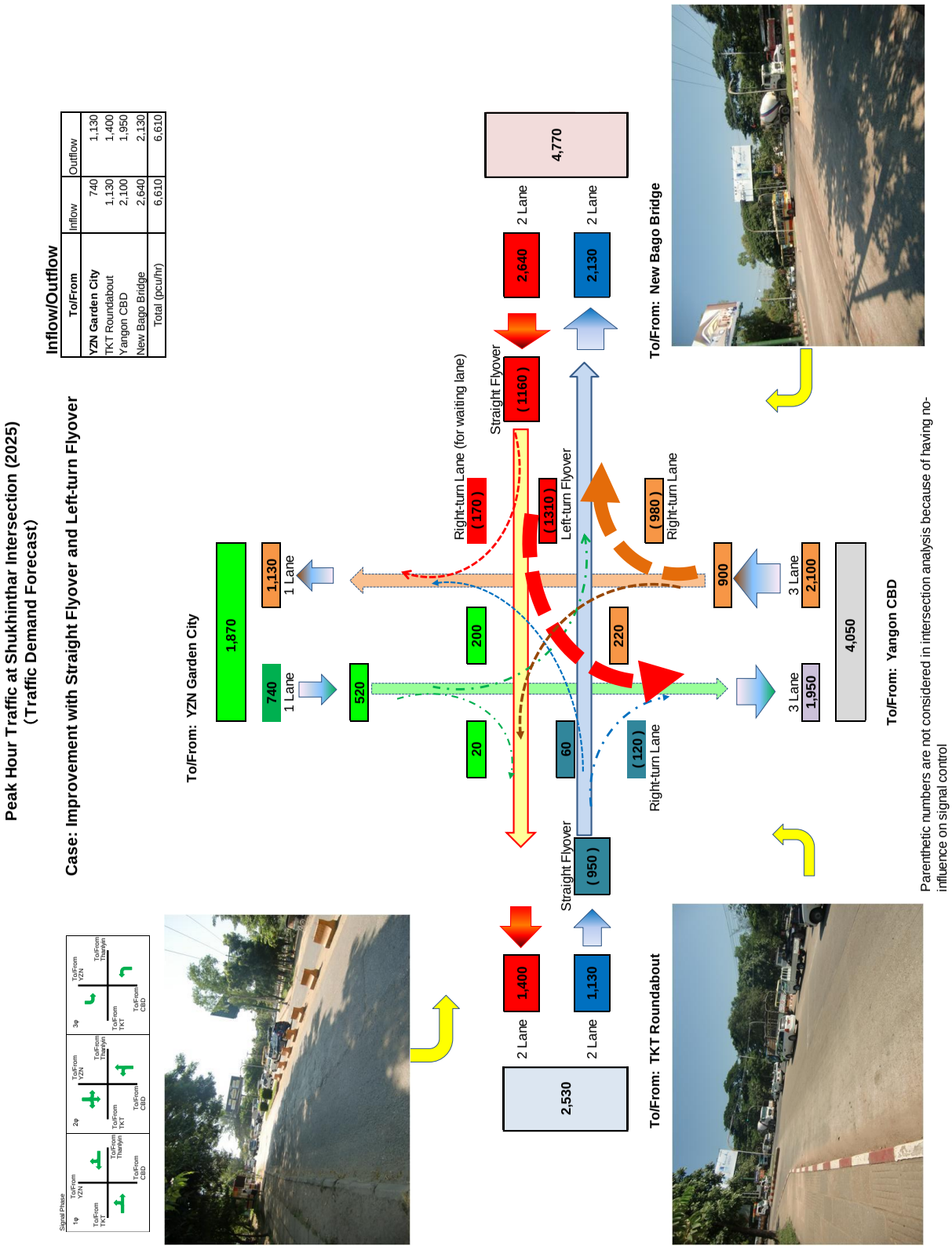
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

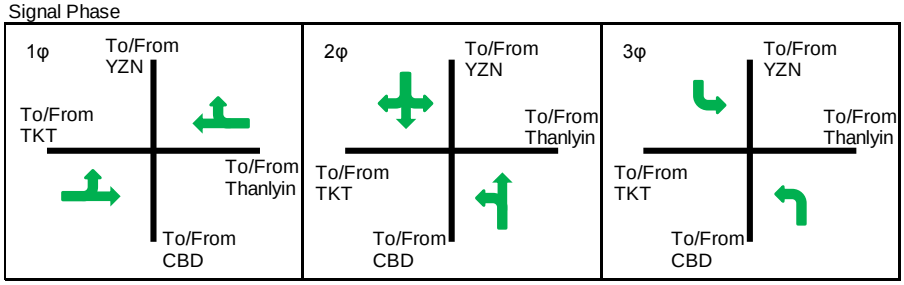
Source: JICA Study Team

Appendix C-5: Case of Improvement with Straight Flyover and Left-turn Flyover at Shukhinthar Intersection in 2025



Source: JICA Study Team

Signal Phase



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Shukhinthar Intersection

Case: 2025 Improvement with Straight and Left-turn Flyover

Entry		Thanlyin to TKT		YZN to CBD		TKT to Thanlyin		CBD to YZN	
Direction		TH	RT	LT	TH+RT	LT	TH	LT	TH
Number of Lane: a		1	1	1	1	1	1	1	2
Basic value of saturation flow rate (PCU/hr): b		2,000	1,800	1,800	2,000	1,800	2,000	1,800	2,000
Reduction coefficient: c (Lane width: m)		1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)					0.996 (3.7)				
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h				2(72)				2(72)	
Saturation flow ratio: i=a*b*c*d*e*f*g		2,000	1,800	1,800	1,992	1,800	2,000	1,800	4,000
Traffic volume (pcu/hr): V		0	170	200	540 (20+520)	60	0	220	900
Traffic volume with compensation of left turn (pcu/hr): V'=V-h				128				148	
Flow ratio: j=V/i or j=V'/i		0.000	0.094	0.071	0.271	0.033	0.000	0.082	0.225
Current cycle length (sec): k		100							
Phase ratio	1φ	0.000	0.094			0.033	0.000		
	2φ				0.271				0.225
	3φ			0.071				0.082	
Demand ratio of intersection *		0.447							
Current green time (sec): l	1φ	18	18			18	18		
	2φ				52				52
	3φ			20				20	
Capacity (pcu/hr): C=i*l/k or i*l/k+h*3600/k		360	324	432	1,036	324	360	432	2,080
Degree of Saturation: V/C **		0.000	0.525	0.463	0.521	0.185	0.000	0.509	0.433
Check		OK	OK	OK	OK	OK	OK	OK	OK

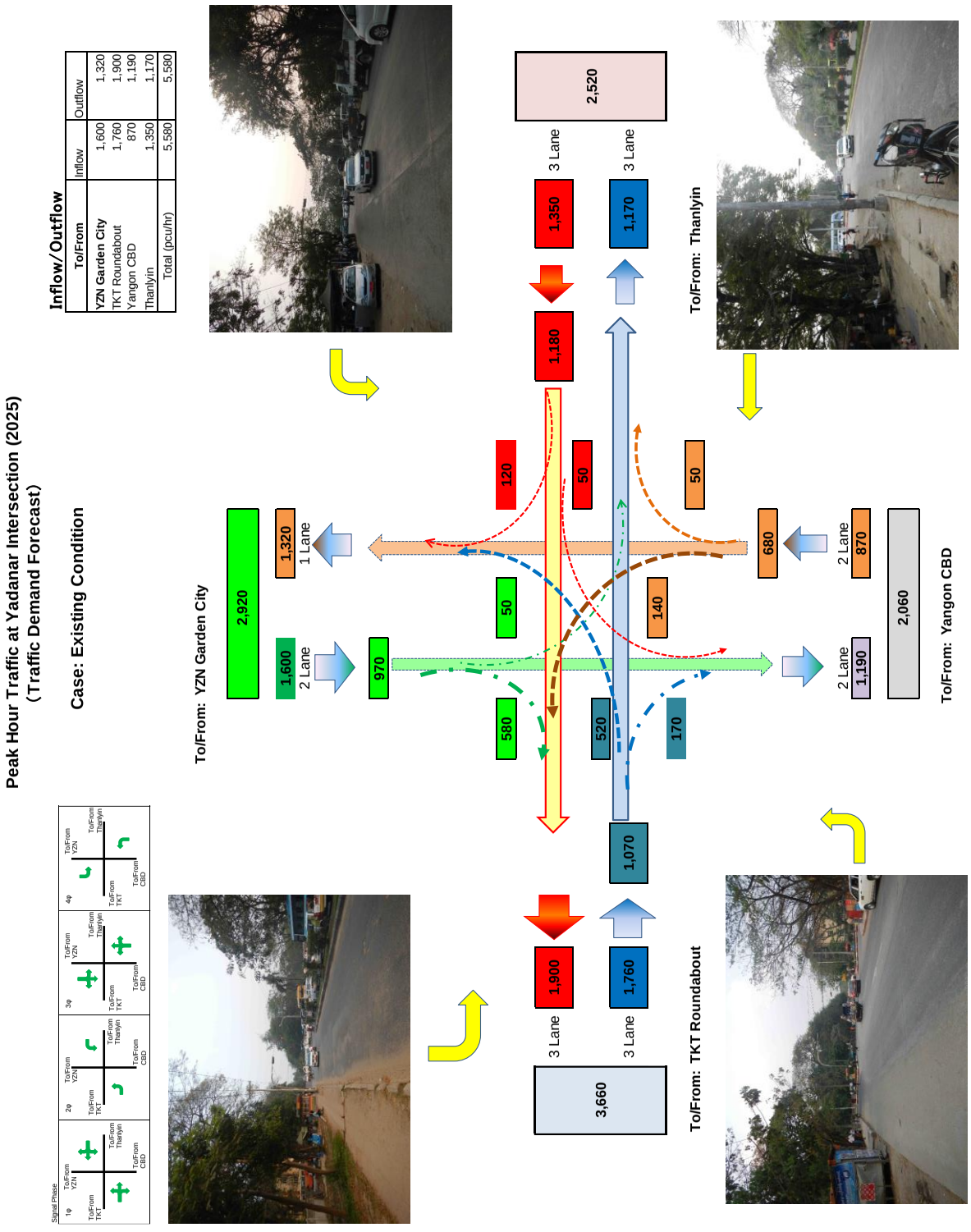
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

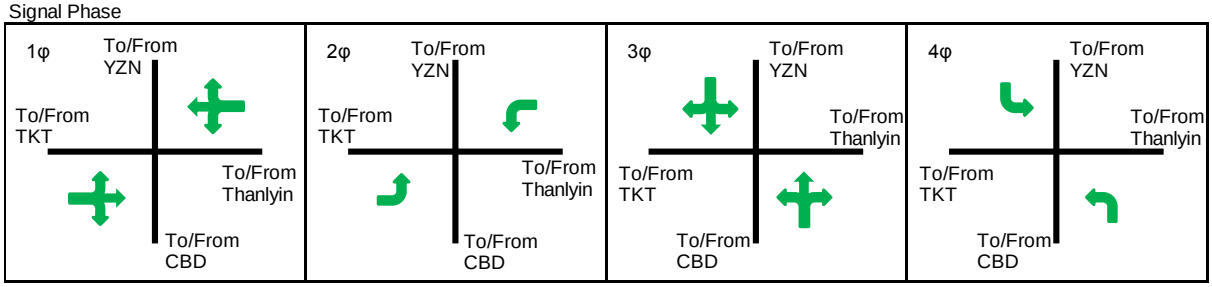
Source: JICA Study Team

Appendix C-6: Case of Existing Condition at Yadanar Intersection in 2025



Source: JICA Study Team

Signal Phase



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Yadanar Intersection

Case: 2025 Existing Condition

Entry		Thanlyin to TKT			YZN to CBD		TKT to Thanlyin			CBD to YZN	
Direction		LT	TH	TH+RT	LT	TH+RT	LT	TH	TH+RT	LT	TH+RT
Number of Lane: a		1	1	1	1	1	1	1	1	1	1
Basic value of saturation flow rate (PCU/hr): b		1,800	2,000	2,000	1,800	2,000	1,800	2,000	2,000	1,800	2,000
Reduction coefficient: c (Lane width: m)		1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)				0.980 (18.5)		0.960 (37.4)			0.971 (27.4)		0.993 (6.8)
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h		2(72)			2(72)		2(72)			2(72)	
Saturation flow ratio: i=a*b*c*d*e*f*g		1,800	2,000	1,960	1,800	1,920	1,800	2,000	1,942	1,800	1,986
Traffic volume (pcu/hr): V		50	1,300 (120+1180)		50	1,550 (580+970)	520	1,240 (170+1070)		140	730 (50+680)
Traffic volume with compensation of left turn (pcu/hr): V'=V-h		0			0		448			68	
Flow ratio: j=V/i or j=V'/i		0.000	0.328		0.000	0.807	0.249	0.315		0.038	0.368
Current cycle length (sec): k		100									
Phase ratio	1φ		0.328					0.315			
	2φ	0.000					0.249				
	3φ					0.807					0.368
	4φ				0.000					0.038	
Demand ratio of intersection *		1.422									
Current green time (sec): l	1φ		20					20			
	2φ	14					14				
	3φ					49					49
	4φ				5					5	
Capacity (pcu/hr): C=i*l/k or C=i*l/k+h*3600/k		324	792		162	941	324	788		162	973
Degree of Saturation: V/C **		0.154	1.641		0.309	1.647	1.605	1.574		0.864	0.750
Check		OK	NG		OK	NG	NG	NG		OK	OK

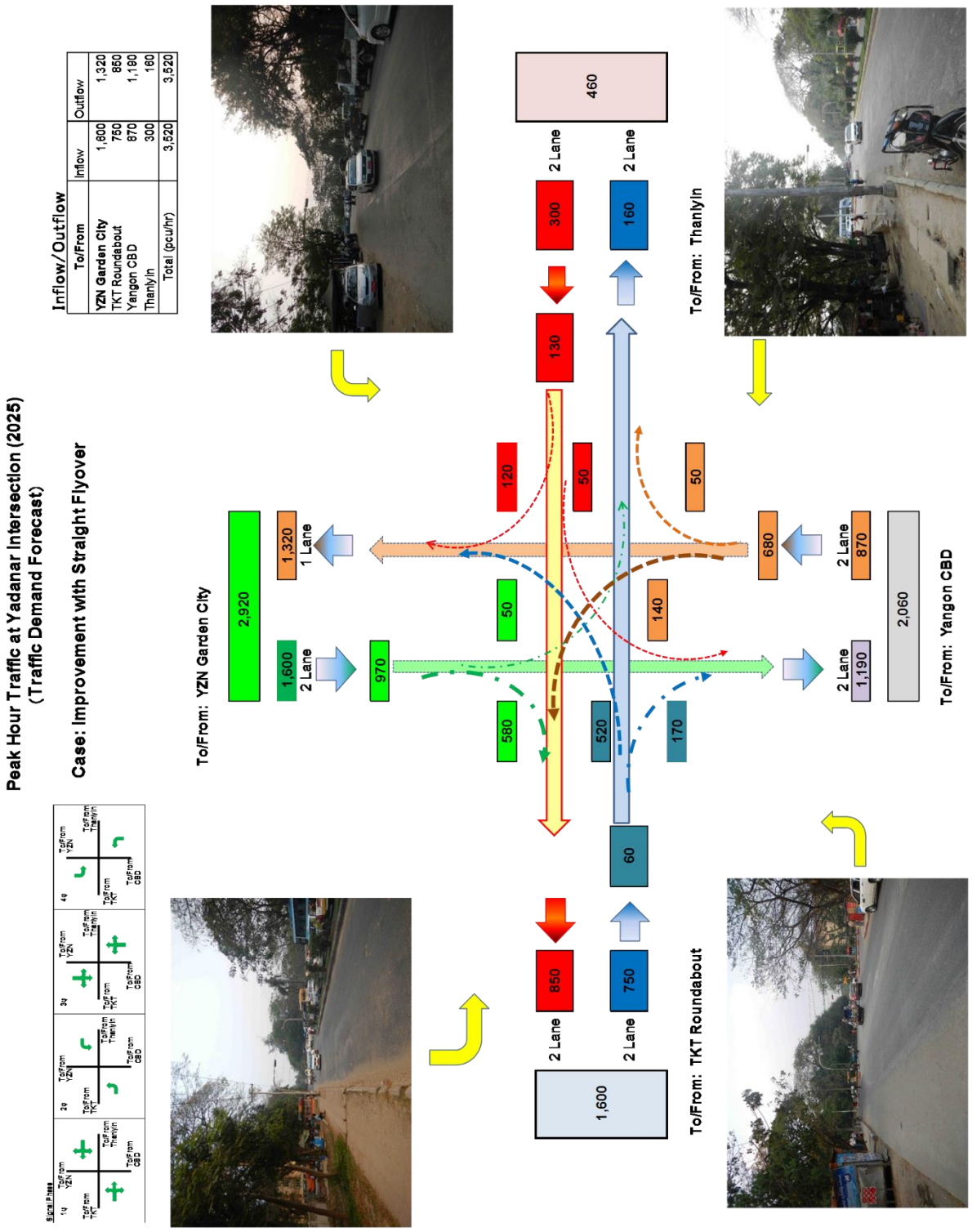
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

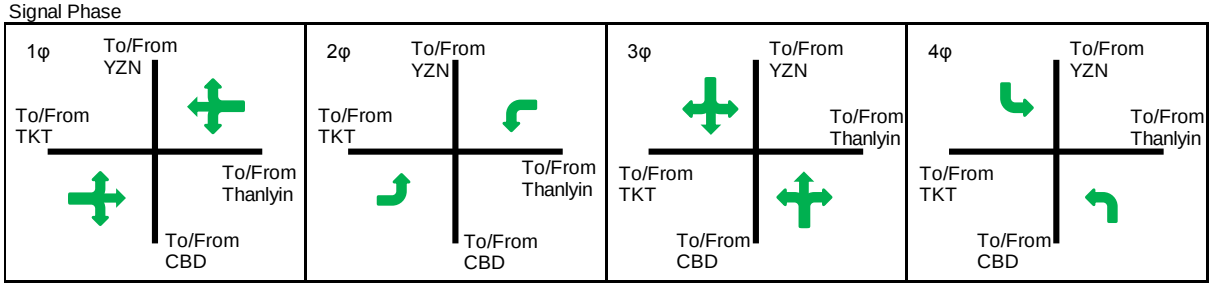
Source: JICA Study Team

Appendix C-7: Case of Improvement with Straight Flyover at Yadanar Intersection in 2025



Source: JICA Study Team

Signal Phase



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Yadanar Intersection

Case: 2025 Improvement with Straight Flyover

Entry		Thanlyin to TKT		YZN to CBD		TKT to Thanlyin		CBD to YZN	
Direction		LT	TH+RT	TH+LT	TH+RT	LT	TH+RT	TH+LT	TH+RT
Number of Lane: a		1	1	1	1	1	1	1	1
Basic value of saturation flow rate (PCU/hr): b		1,800	2,000	2,000	2,000	1,800	2,000	2,000	2,000
Reduction coefficient: c (Lane width: m)		1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)			0.950 (48.0)		0.926 (72.5)		0.925 (73.9)		0.988 (11.5)
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h		2(72)		0.917 (6.3) 2(72)		2(72)		0.542 (32.2) 2(72)	
Saturation flow ratio: i=a*b*c*d*e*f*g		1,800	1,900	1,834	1,852	1,800	1,850	1,084	1,976
Traffic volume (pcu/hr): V		50	250 (120+130)	1,600 (50+580+970)		520	230 (170+60)	870 (140+50+680)	
Traffic volume with compensation of left turn (pcu/hr): V'=V-h		0				448			
Flow ratio: j=V/i or j=V'/i		0.000	0.132	0.434		0.249	0.124	0.284	
Current cycle length (sec): k		100							
Phase ratio	1φ		0.132				0.124		
	2φ	0.000				0.249			
	3φ			0.434				0.284	
	4φ								
Demand ratio of intersection *		0.815							
Current green time (sec): l	1φ		16				16		
	2φ	23				23			
	3φ			41				41	
	4φ								
Capacity (pcu/hr): C=i*l/k or C=i*l/k+h*3600/k		486	304	1,511		486	296	1,255	
Degree of Saturation: V/C **		0.103	0.822	1.059		1.070	0.777	0.693	
Check		OK	OK	NG		NG	OK	OK	

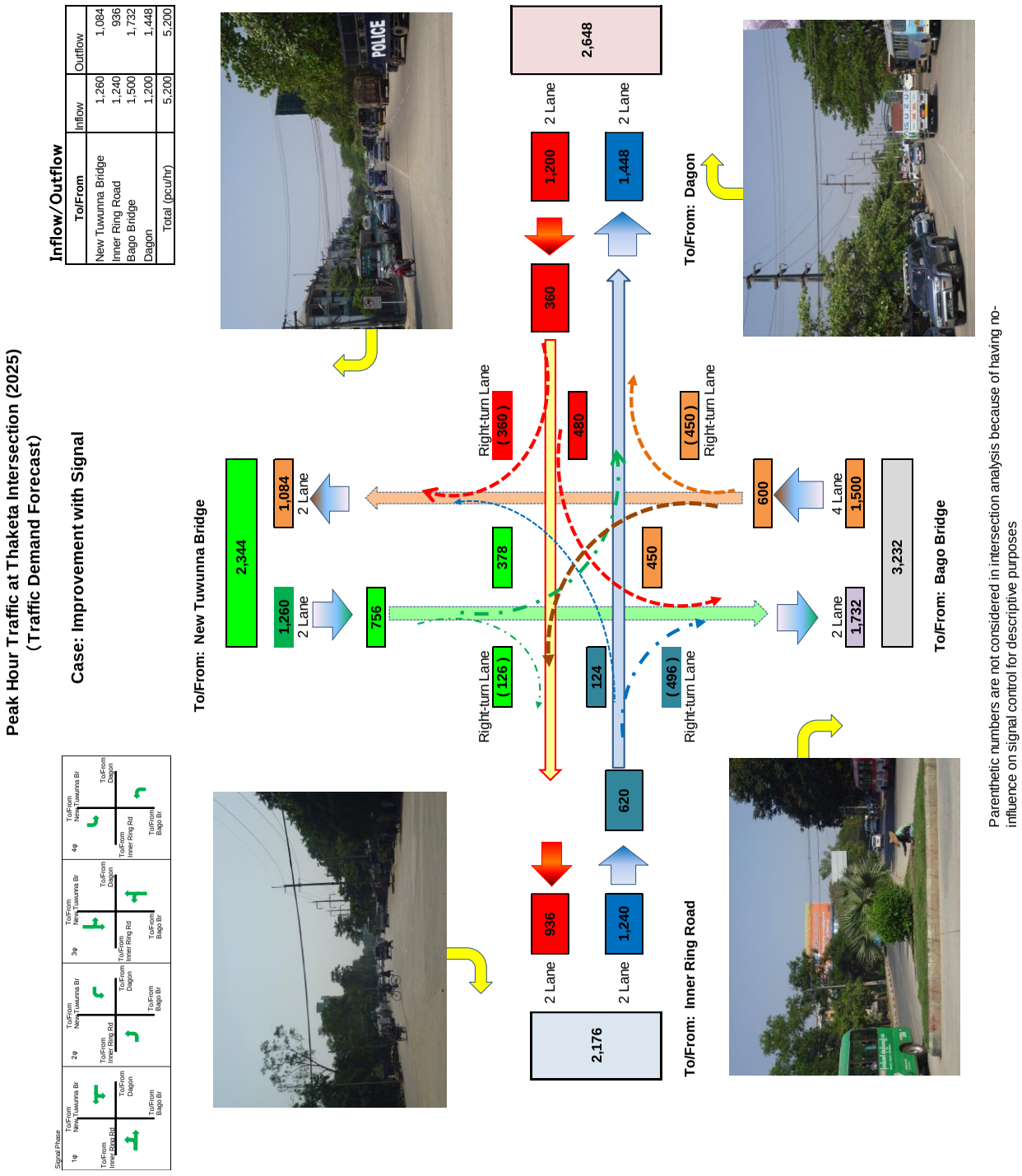
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

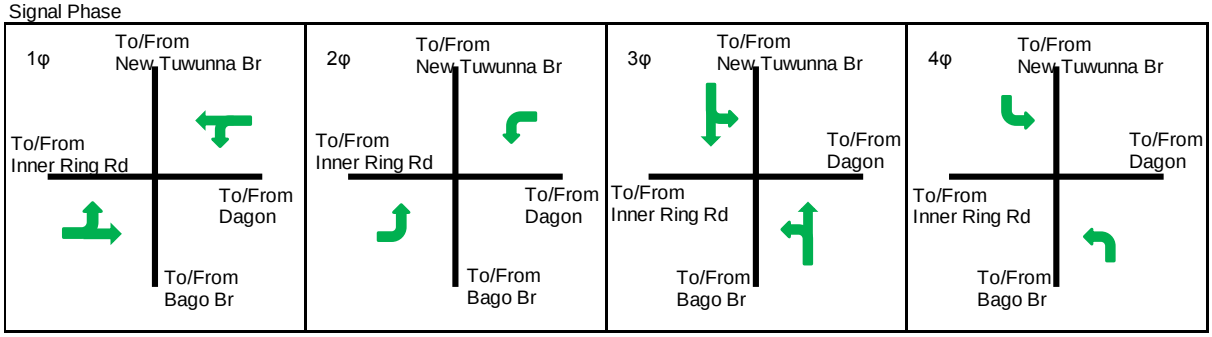
Source: JICA Study Team

Appendix C-8: Case of Improvement with Signal at Thaketa Intersection in 2025



Source: JICA Study Team

Signal Phase



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Thaketa Intersection

Case: 2025 Improvement with Signal

Entry		Dagon to Inner Ring Rd		New Tuwunna Br to Bago Br		Inner Ring Rd to Dagon		Bago Br to New Tuwunna Br	
Direction		LT	TH	LT	TH	LT	TH	LT	TH
Number of Lane: a		1	1	1	1	1	1	2	2
Basic value of saturation flow rate (PCU/hr): b		1,800	2,000	1,800	2,000	1,800	2,000	1,800	2,000
Reduction coefficient: c (Lane width: m)		1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.00)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)									
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h		2(72)		2(72)		2(72)		2(72)	
Saturation flow ratio: i=a*b*c*d*e*f*g		1,800	2,000	1,800	2,000	1,800	2,000	3,600	4,000
Traffic volume (pcu/hr): V		480	360	378	756	124	620	450	600
Traffic volume with compensation of left turn (pcu/hr): V'=V-h		408		306		52		378	
Flow ratio: j=V/i or j=V'/i		0.227	0.180	0.170	0.378	0.029	0.310	0.105	0.150
Current cycle length (sec): k		100							
Phase ratio	1φ		0.180				0.310		
	2φ	0.227				0.029			
	3φ				0.378				0.150
	4φ			0.170				0.105	
Demand ratio of intersection *		1.085							
Current green time (sec): l	1φ		26				26		
	2φ	18				18			
	3φ				31				31
	4φ			13				13	
Capacity (pcu/hr): C=i*l/k or C=i*l/k+h*3600/k		396	520	306	620	396	520	540	1,240
Degree of Saturation: V/C **		1.212	0.692	1.235	1.219	0.313	1.192	0.833	0.484
Check		NG	OK	NG	NG	OK	NG	OK	OK

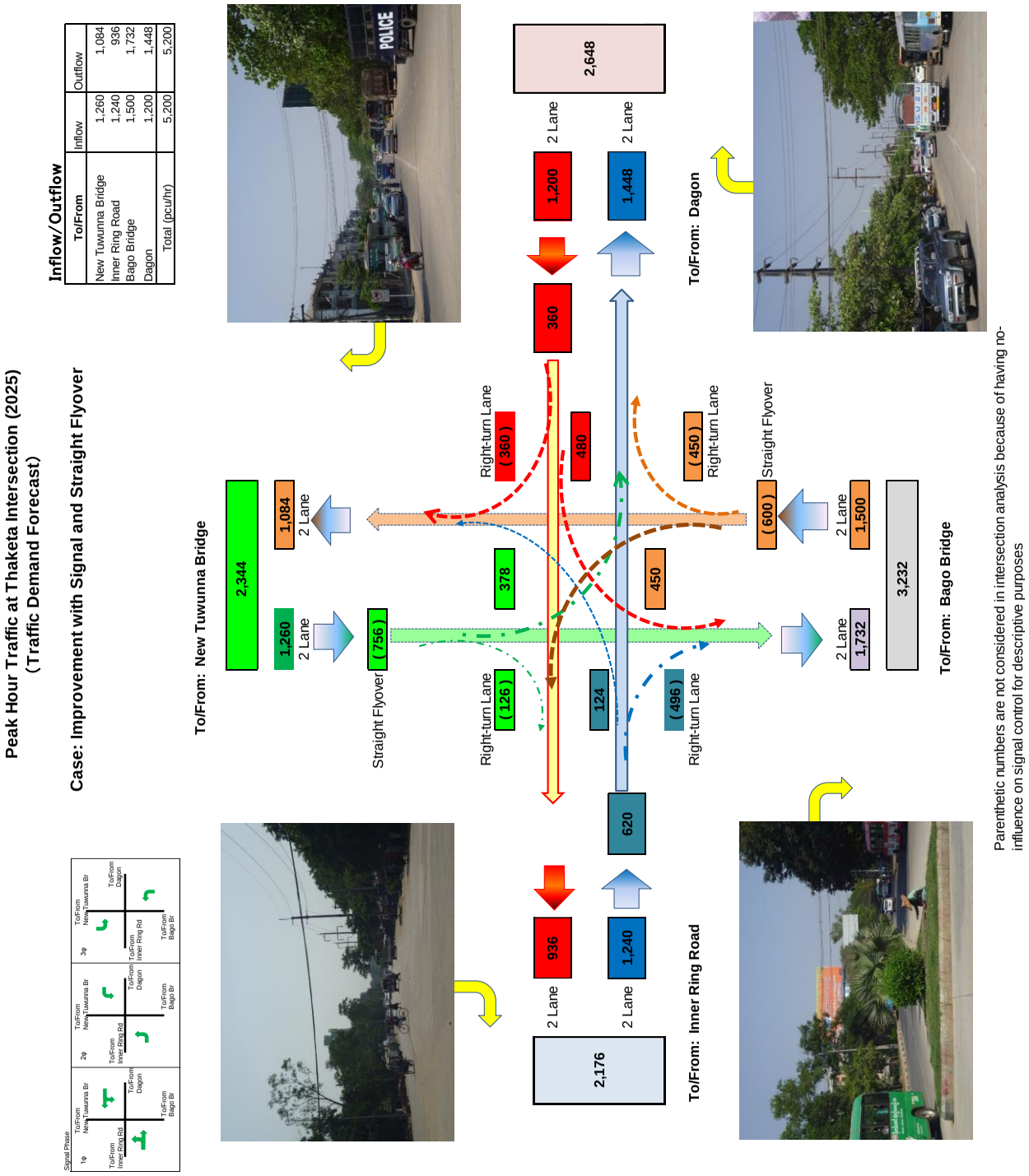
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

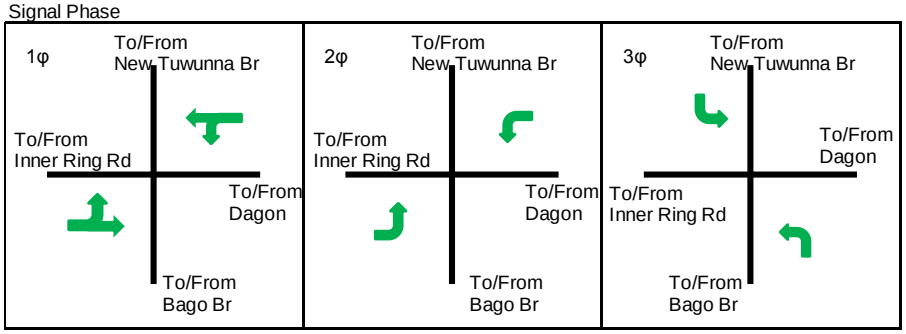
Source: JICA Study Team

Appendix C-9: Case of Improvement with Signal and Straight Flyover at Thaketa Intersection in 2025



Source: JICA Study Team

Signal Phase



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Thaketa Intersection

Case: 2025 Improvement with Signal and Straight Flyover

Entry		Dagon to Inner Ring Rd		New Tuwunna Br to Bago Br	Inner Ring Rd to Dagon		Bago Br to New Tuwunna Br
Direction		LT	TH	LT	LT	TH	LT
Number of Lane: a		1	1	2	1	1	2
Basic value of saturation flow rate (PCU/hr): b		1,800	2,000	1,800	1,800	2,000	1,800
Reduction coefficient: c (Lane width: m)		1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)							
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h		2(72)			2(72)		
Saturation flow ratio: i=a*b*c*d*e*f*g		1,800	2,000	3,600	1,800	2,000	3,600
Traffic volume (pcu/hr): V		480	360	378	124	620	450
Traffic volume with compensation of left turn (pcu/hr): V'=V-h		408			52		
Flow ratio: j=V/i or j=V'/i		0.227	0.180	0.105	0.029	0.310	0.125
Current cycle length (sec): k		100					
Phase ratio	1φ		0.180			0.310	
	2φ	0.227			0.029		
	3φ			0.105			0.125
Demand ratio of intersection *		0.662					
Current green time (sec): l	1φ		42			42	
	2φ	32			32		
	3φ			16			16
Capacity (pcu/hr): C=i*l/k or C=i*l/k+h*3600/k		648	840	576	648	840	576
Degree of Saturation: V/C **		0.741	0.429	0.656	0.191	0.738	0.781
Check		OK	OK	OK	OK	OK	OK

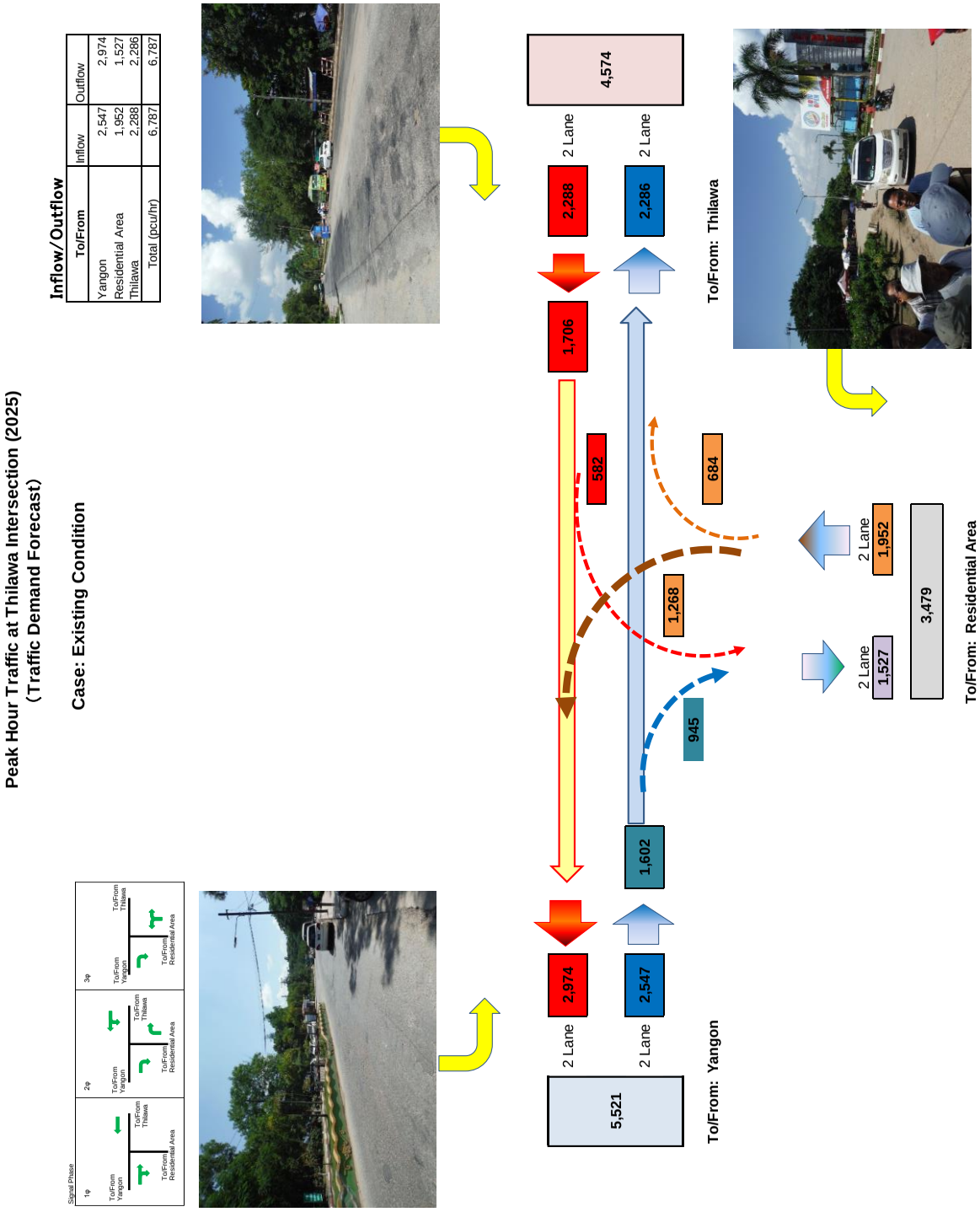
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

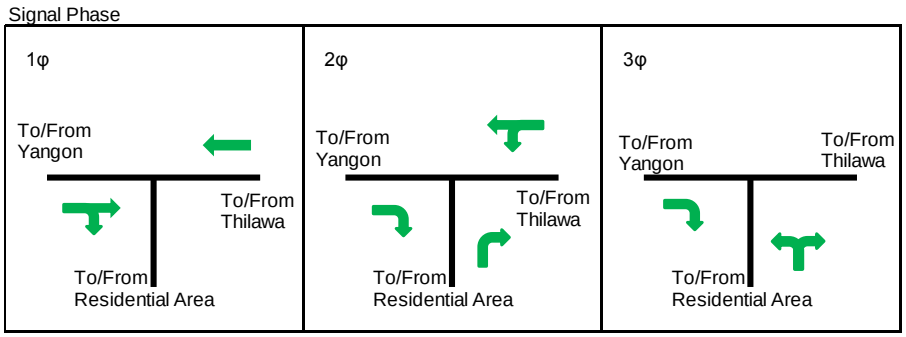
Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

Source: JICA Study Team

Appendix C-10: Case of Existing Condition at Thilawa Intersection in 2025



Source: JICA Study Team



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Thilawa Intersection

Case: 2025 Existing Condition

Entry		Thilawa to Yangon		From Residential Area		Yangon to Thilawa	
Direction		LT	TH	LT	RT	TH	RT
Number of Lane: a		1	1	1	1	1	1
Basic value of saturation flow rate (PCU/hr): b		1,800	2,000	1,800	1,800	2,000	1,800
Reduction coefficient: c (Lane width: m)		1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)							
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h							
Saturation flow ratio: i=a*b*c*d*e*f*g		1,800	2,000	1,800	1,800	2,000	1,800
Traffic volume (pcu/hr): V		582	1,706	1,268	684	1,602	945
Traffic volume with compensation of left turn (pcu/hr): V'=V-h							
Flow ratio: j=V/i or j=V'/i		0.323	0.853	0.704	0.380	0.801	0.525
Current cycle length (sec): k		100					
Phase ratio	1φ		0.801			0.801	0.525
	2φ	0.323	0.052		0.323		0.000
	3φ			0.704	0.057		0.000
Demand ratio of intersection *		1.828					
Current green time (sec): l	1φ		38			38	38
	2φ	16	16		16		16
	3φ			34	34		34
Capacity (pcu/hr): C=i*l/k or C=i*l/k+h*3600/k		288	1,080	612	900	760	1,584
Degree of Saturation: V/C **		2.021	1.580	2.072	0.760	2.108	0.597
Check		NG	NG	NG	OK	NG	OK

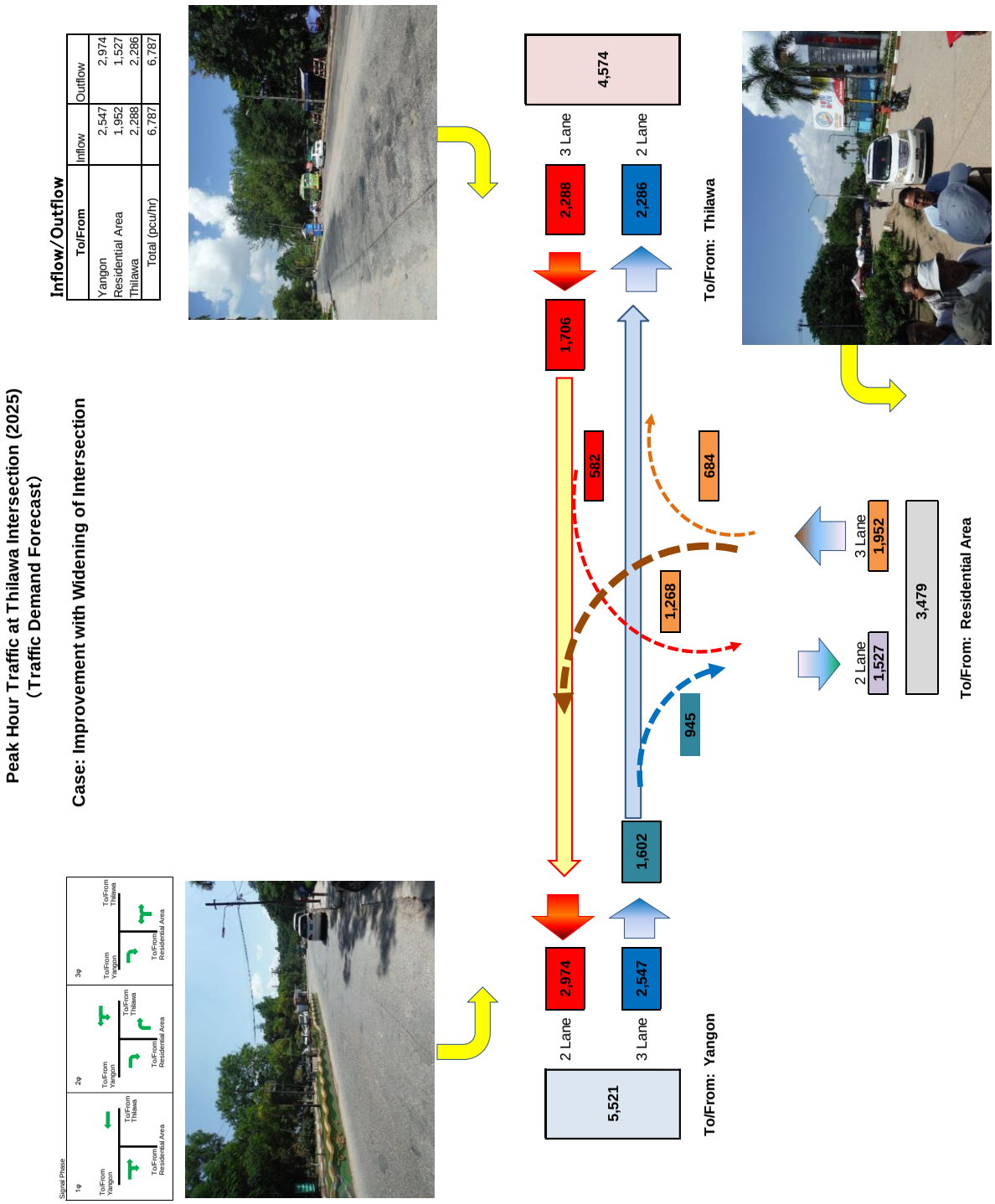
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

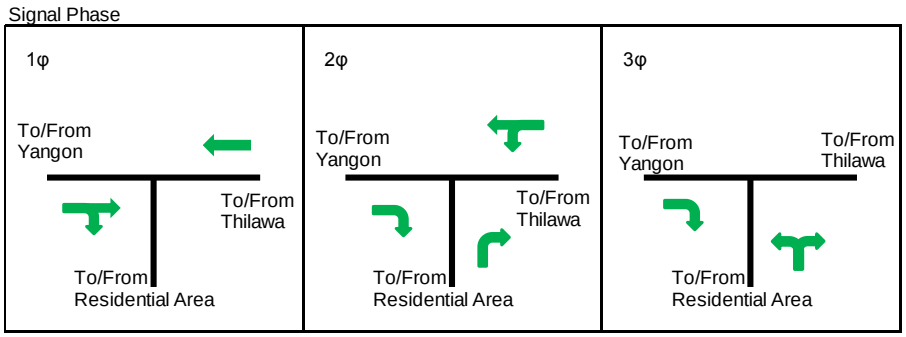
Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

Source: JICA Study Team

Appendix C-11: Case of Improvement with Widening of Intersection at Thilawa Intersection in 2025



Source: JICA Study Team



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Thilawa Intersection

Case: 2025 Improvement with Widening of Intersection

Entry		Thilawa to Yangon		From Residential Area		Yangon to Thilawa	
Direction		LT	TH	LT	RT	TH	RT
Number of Lane: a		1	2	2	1	2	1
Basic value of saturation flow rate (PCU/hr): b		1,800	2,000	1,800	1,800	2,000	1,800
Reduction coefficient: c (Lane width: m)		1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)							
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h							
Saturation flow ratio: i=a*b*c*d*e*f*g		1,800	4,000	3,600	1,800	4,000	1,800
Traffic volume (pcu/hr): V		582	1,706	1,268	684	1,602	945
Traffic volume with compensation of left turn (pcu/hr): V'=V-h							
Flow ratio: j=V/i or j=V'/i		0.323	0.426	0.352	0.380	0.400	0.525
Current cycle length (sec): k		100					
Phase ratio	1φ		0.400			0.400	0.400
	2φ	0.323	0.026		0.323		0.125
	3φ			0.352	0.057		0.000
Demand ratio of intersection *		1.075					
Current green time (sec): l	1φ		32			32	32
	2φ	27	27		27		27
	3φ			29	29		29
Capacity (pcu/hr): C=i*l/k or C=i*l/k+h*3600/k		486	2,360	1,044	1,008	1,280	1,584
Degree of Saturation: V/C **		1.198	0.723	1.215	0.679	1.252	0.597
Check		NG	OK	NG	OK	NG	OK

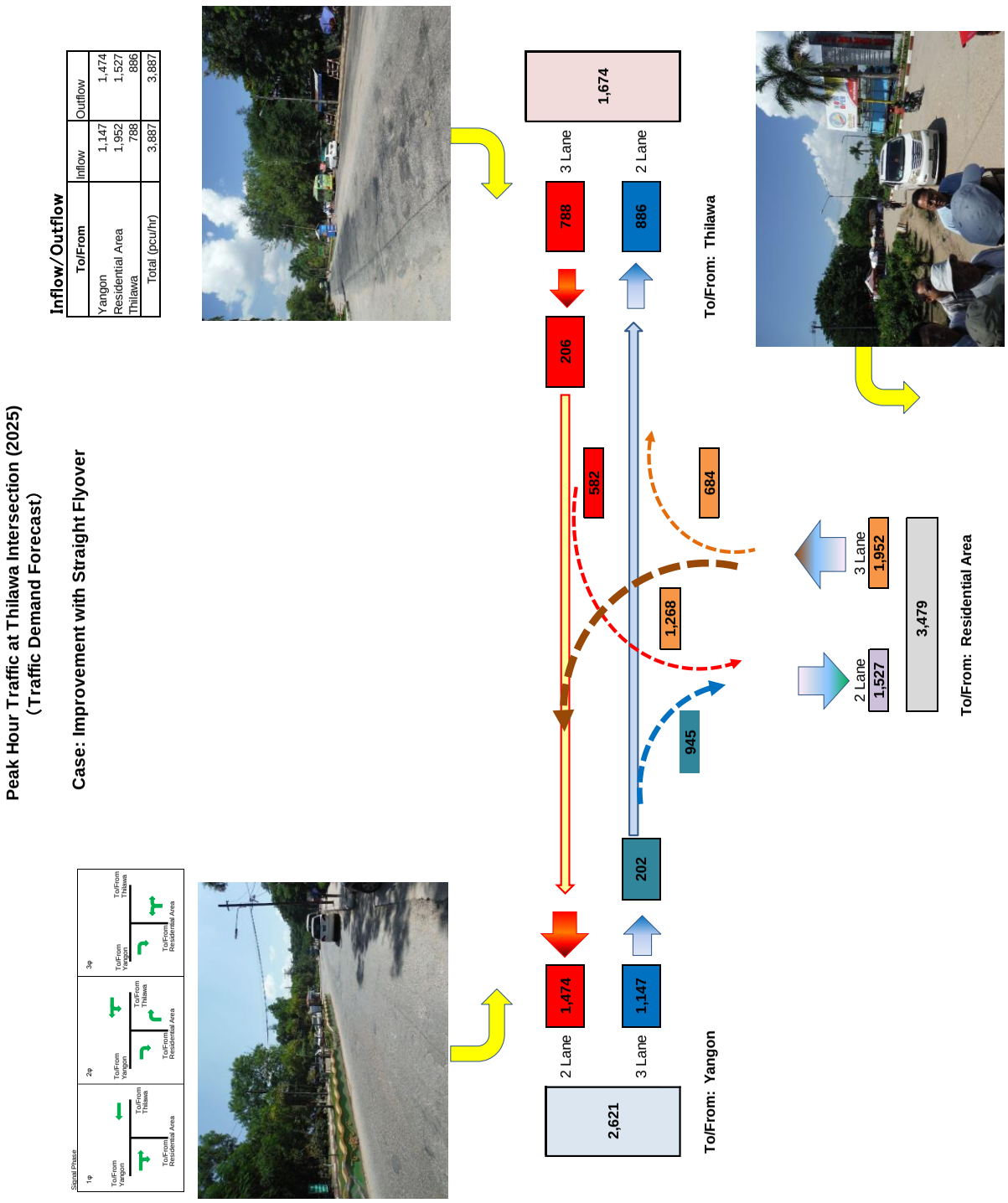
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

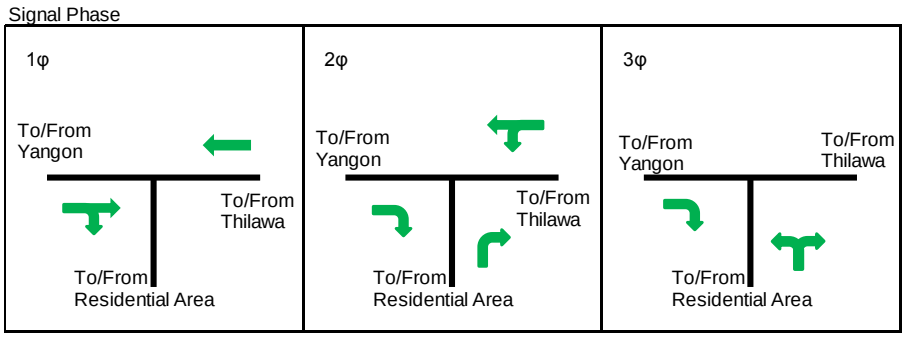
Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

Source: JICA Study Team

Appendix C-12: Case of Improvement with Straight Flyover at Thilawa Intersection in 2025



Source: JICA Study Team



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Thilawa Intersection

Case: 2025 Improvement with Straight Flyover

Entry		Thilawa to Yangon		From Residential Area		Yangon to Thilawa	
Direction		LT	TH	LT	RT	TH	TH+RT
Number of Lane: a		1	1	2	1	1	1
Basic value of saturation flow rate (PCU/hr): b		1,800	2,000	1,800	1,800	2,000	2,000
Reduction coefficient: c (Lane width: m)		1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)							0.901
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h							
Saturation flow ratio: i=a*b*c*d*e*f*g		1,800	2,000	3,600	1,800	2,000	1,802
Traffic volume (pcu/hr): V		582	206	1,268	684	1,147 (945+202)	
Traffic volume with compensation of left turn (pcu/hr): V'=V-h							
Flow ratio: j=V/i or j=V'/i		0.323	0.103	0.352	0.380	0.302	
Current cycle length (sec): k		100					
Phase ratio	1φ		0.103			0.302	
	2φ	0.323	0.000		0.323		
	3φ			0.352	0.057		
Demand ratio of intersection *		0.977					
Current green time (sec): l	1φ		27			27	
	2φ	29	29		29		
	3φ			32	32		
Capacity (pcu/hr): C=i*l/k or C=i*l/k+h*3600/k		522	1,120	1,152	1,098	1,027	
Degree of Saturation: V/C **		1.115	0.184	1.101	0.623	1.117	
Check		NG	OK	NG	OK	NG	

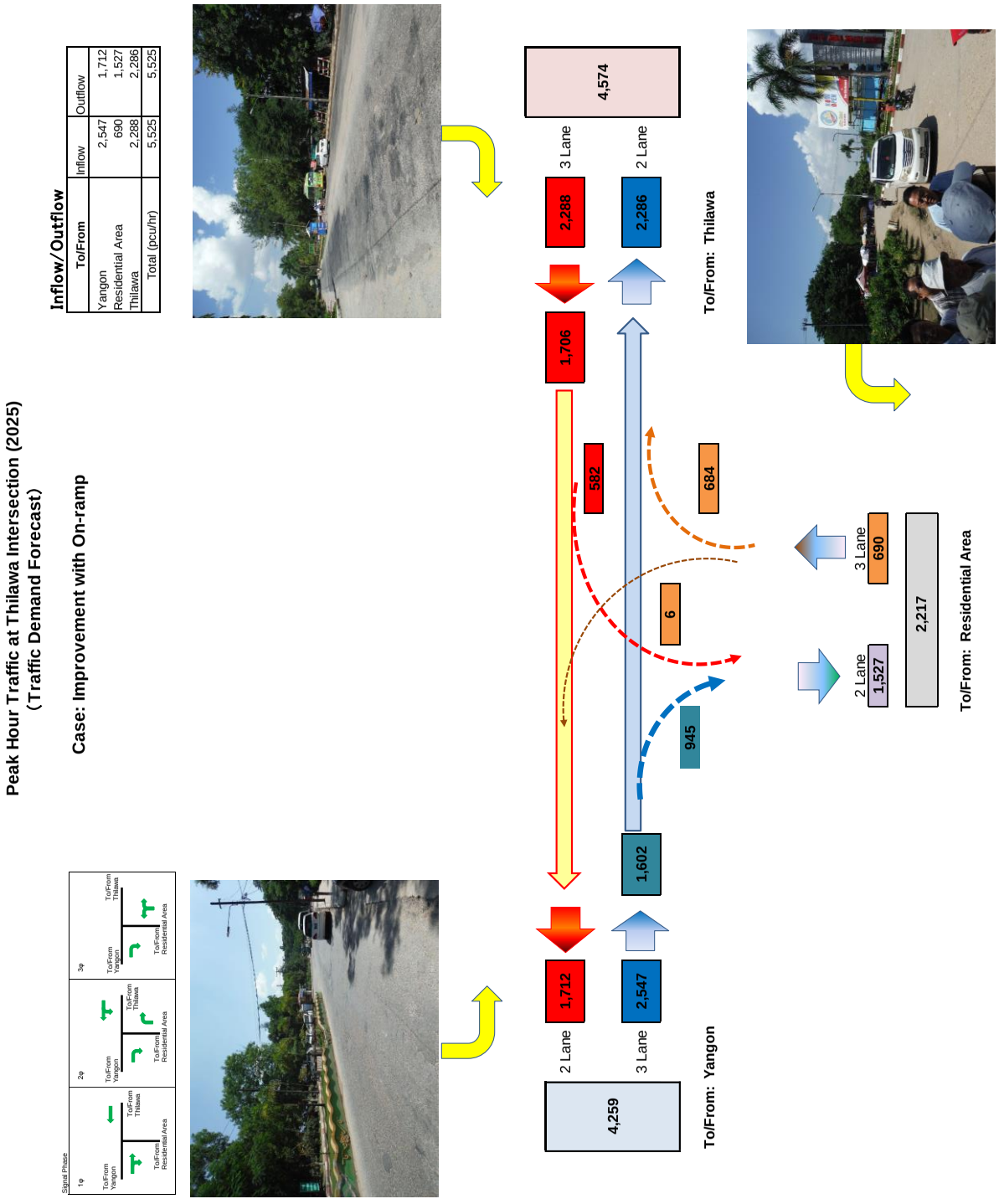
TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

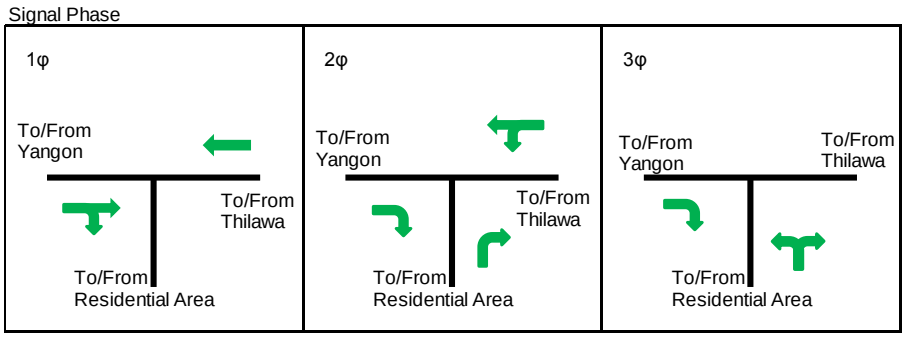
Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

Source: JICA Study Team

Appendix C-13: Case of Improvement with On-ramp at Thilawa Intersection in 2025



Source: JICA Study Team



Source: JICA Study Team

Sufficiency (Saturation) Analysis of Thilawa Intersection

Case: 2025 Improvement with On-ramp

Entry		Thilawa to Yangon		From Residential Area		Yangon to Thilawa	
Direction		LT	TH	LT	RT	TH	RT
Number of Lane: a		1	2	1	1	2	1
Basic value of saturation flow rate (PCU/hr): b		1,800	2,000	1,800	1,800	2,000	1,800
Reduction coefficient: c (Lane width: m)		1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)	1.000 (3.25)
Reduction coefficient: d (Gradient: %)		1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)	1.000 (0.30)
Reduction coefficient: e (Share of large vehicle: %)		1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)	1.000 (0.00)
Reduction coefficient: f (Share of right turn : %)							
Reduction coefficient: g (Share of left turn: %) (No. of left turn for transition time (nos./cycle)): h							
Saturation flow ratio: i=a*b*c*d*e*f*g		1,800	4,000	1,800	1,800	4,000	1,800
Traffic volume (pcu/hr): V		582	1,706	6	684	1,602	945
Traffic volume with compensation of left turn (pcu/hr): V'=V-h							
Flow ratio: j=V/i or j=V'/i		0.323	0.426	0.003	0.380	0.400	0.525
Current cycle length (sec): k		102					
Phase ratio	1φ		0.400			0.400	0.400
	2φ	0.323	0.026		0.323		0.125
	3φ			0.003	0.057		0.000
Demand ratio of intersection *		0.780					
Current green time (sec): I	1φ		46			46	46
	2φ	37	37		37		37
	3φ			7	7		7
Capacity (pcu/hr): C=i*I/k or C=i*I/k+h*3600/k		653	3,255	124	776	1,804	1,588
Degree of Saturation: V/C **		0.891	0.524	0.048	0.881	0.888	0.595
Check		OK	OK	OK	OK	OK	OK

TH: Through LT: Left turn RT: Right turn

Note(*): Evaluation of Demand Ratio of Intersection: Over 0.9 means that improvement of intersection is nesessary.

Note(**): Evaluation of Degree of Saturation: Over 1.0 means that improvement of intersection is nesessary.

Source: JICA Study Team

Appendix D Comparison for Width of Bridge between Bago River Bridge and Dala Bridge

D.1. Introduction

JICA Study Team compared width of bridge between Bago River Bridge and Dala Bridge and confirmed relevance of bridge plan for reference.

The conditions of Dala Bridge were refered to the Final Report for "The Feasibility Study for Korea-Myanmar Friendship Bridge Project".

D.2. Design Conditions for Width of Bago River Bridge

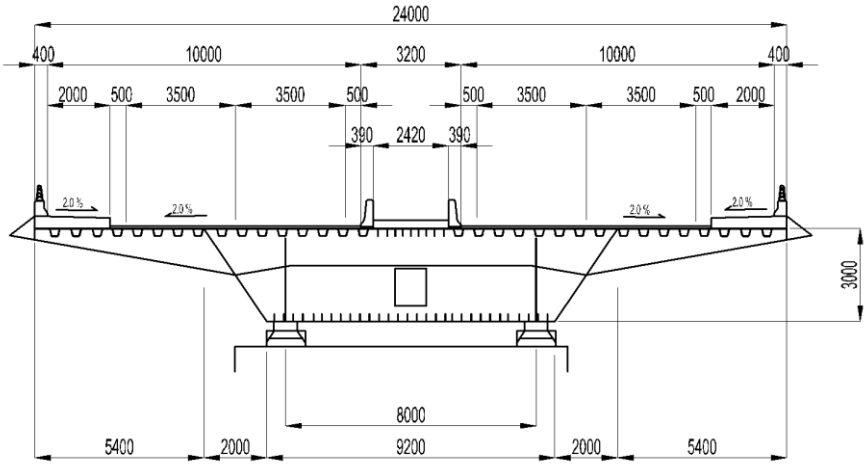
The design conditions for width of Bago River Bridge are shown below.

Table D.1 Design Conditions for Width of Bago River Bridge

Item	AASHTO	ASEAN Highway Standards	Japanese Road Design Standard	Recommendation for this study	Remarks
Road Classification	Urban Arterials	Class I	Class 4 (Urban Arterials)	Urban Arterials	
Width of Lane (m)	3.3 ~ 3.6	3.5	3.25	**3.5**	
Width of Right Shoulder (m)	0.3 ~ 3.6	3.0	0.5	**0.5**	
Width of Left Shoulder (m)	-	-	0.5	**0.5**	
Width of Median (m)	1.2 ~ 24.0	3.0	1.0	**2.5 ~ 4.2**	Include width of left shoulder
Width of Sidewalk (m)	1.2 ~ 2.4	-	2.0 or more	**2.0**	

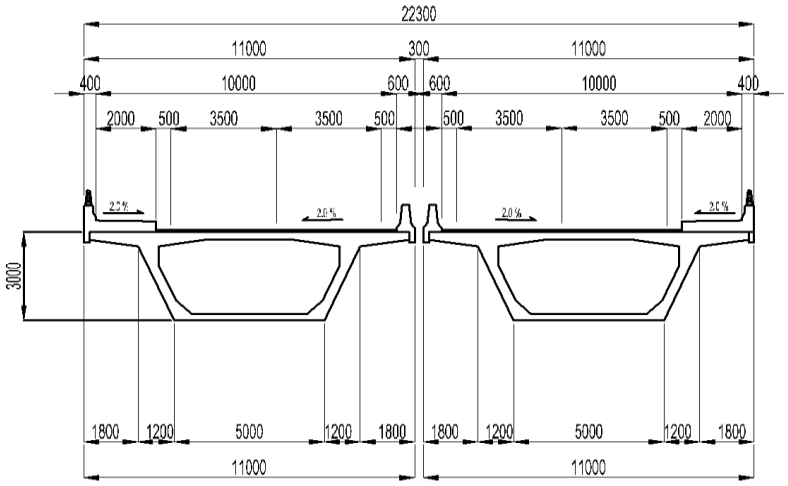
Source: JICA Study Team

The typical cross sections of bridge are shown in the figure below.



Source: JICA Study Team

Figure D.1 Typical Cross Section of Bridge (Steel Cable Stayed Bridge)



Source: JICA Study Team

Figure D.2 Typical Cross Section of Bridge (Precast PC Box Girder Bridge)

D.3. Design Conditions of Dala Bridge

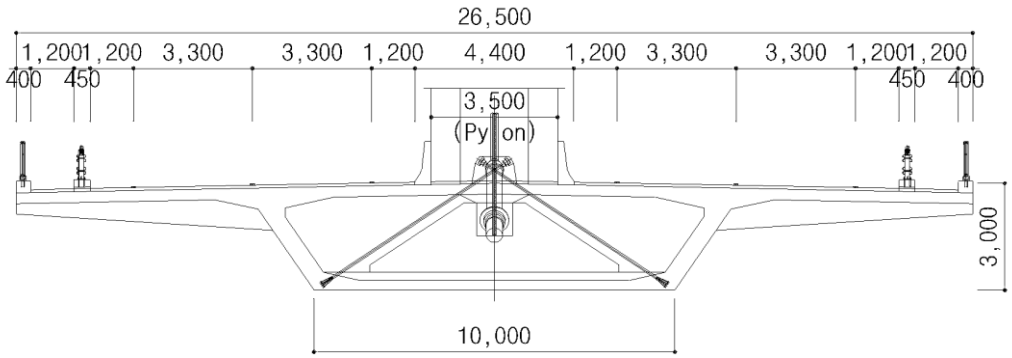
The design conditions for width of Dala Bridge are shown below.

Table D.2 Design Conditions for Width of Dala Bridge

Item		Earthwork	Bridge
Lane	Main roads	3.0 ~ 3.6	3.3
	Connection roads	Longer than 5.0 pavement including shoulder	3.3
Median Strip		1.2 ~ 24.0	1.2
Shoulder	Main roads	0.3 ~ 3.6	1.2
	Right side of connection roads	1.8 ~ 3.6	1.8
	Left side of connection roads	1.2 ~ 3.0	1.2
Sidewalk		Longer than 1.2	1.2

Source: Final Report for "The Feasibility Study for Korea-Myanmar Friendship Bridge Project"

The typical cross sections of bridge are shown below.



Source: Final Report for "The Feasibility Study for Korea-Myanmar Friendship Bridge Project"

Figure D.3 Typical Cross Section of Bridge (Cable-stay Bridge)

D.4. Comparison for Width of Bago River Bridge and Dala Bridge

The following table shows the comparison for width of Bago River Bridge and Dala Bridge.

Table D.3 Comparison for Width of Bago River Bridge and Dala Bridge

Item	Condition of Bago River Bridge	Dala Bridge	Remarks
Road Classification	Urban Arterials	Urban Arterials	
Width of Lane (m)	3.5	3.3	
Width of Right Shoulder (m)	0.5	1.2	
Width of Left Shoulder (m)	0.5	1.2	
Width of Median (m)	2.5 ~ 4.2	6.8	Include width of left shoulder
Width of Sidewalk (m)	2.0	1.2	
Total Width (m)	22.3 ~ 24.0	26.5	Include width of guard rail

Source: JICA Study Team

The width of Bago Bridge and Dala Bridge are pursuant to relevant standards.

For assessing the relevance of the bridge width, an economical efficiency and a safety are considered.

Bago Bridge is much better at the economical efficiency than Dala Bridge because the width of Bago Bridge is narrower than Dala Bridge.

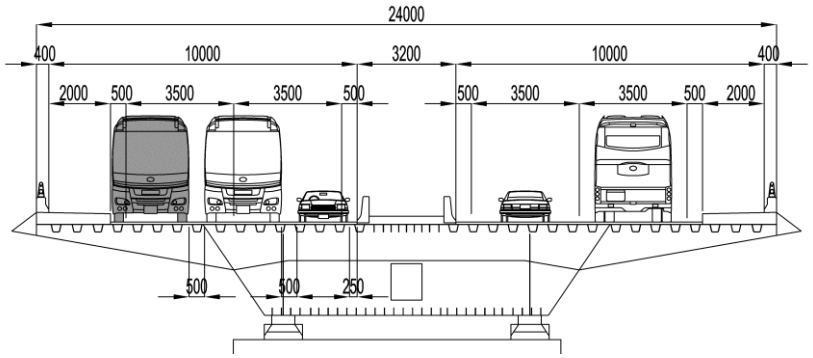
It should be considered in safety of vehicle and pedestrian at assessing the safety.

Considering the vehicular safety, the width of Bago Bridge is enough for emergency passing as shown in the figure below.

Considering the pedestrian safety, the width of Dala Bridge, 1.2m, is narrow for passing each other.

The width of sidewalk is necessary at least 2.0m in accordance with the Japanese Road Design Standards and the width of the existing sidewalk of Thanlyin chin Kat Road and Shukhinthar Road is 2.0m.

Therefore, the width of Bago Bridge is appropriate at the economical efficiency and the safety.

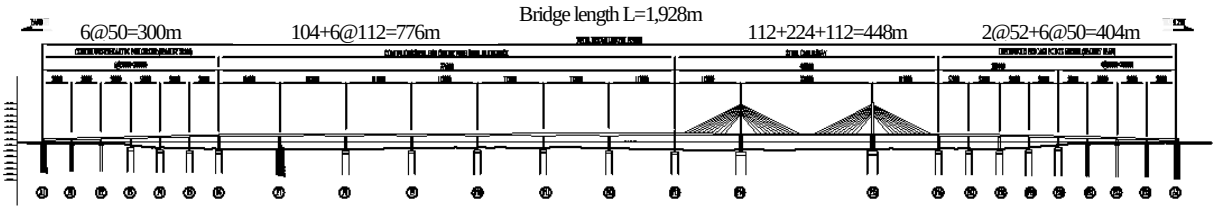


Source: JICA Study Team

Figure D.4 Cross Section of Bago River Bridge in Emergency Case

Appendix E Structural comparison of Bago River Bridge and Dala Bridge

In order to justify the validity of the cost estimate of the Project, the estimated cost was compared with that of a similar project.



Source: JICA Study Team

Figure E-1 Profile of Bago River Bridge

Table E-1 Brief description of Bago River Bridge

Item	Span	Superstructure type	Length (m)	Width (m)
A1-P6	6	PC box girder (span-by-span erection)	300m	11.0 x 2
P6-P13	7	Steel box girder with steel deck slab	776m	11.0 x 2
P13-P16	3	Steel cable stayed girder	448m	22.4
P16-A2	8	PC box girder (span-by-span erection)	404m	11.0 x2
		Total length	1,928m	

Source: JICA Study Team

1.1.1 Outlines of the similar project

Yangon-Dala Bridge Construction Project funded by South Korean loan is ongoing similar bridge project to connect two lands split by the wide river as Bago River Bridge.

Source: http://myanmarcs.focuscoregroup.com/loan-approved-for-construction-of-yangon-dala-bridge/

Figure E-2 Rendering perspective of Yangon-Dala Bridge

According to the F/S report, outline of Yangon-Dala Bridge is;

- Soft Loan of USD 137.8 million from South Korea, and total project cost amounts USD 168 .2 million (approximately JPY 2.02 billion)
- Payment period of 40years including grace period of initial 15years
- Low interest (0.01%)
- 5years of construction period
- Total bridge length 6,144 feet (approximately 1,872meter)
- linking Phone Gyi Road, Landmadaw Township in Yangon CBD to Bo Min Yaung Road in Dala Township over Yangon River

The proportion of each span are shown in Table E-2.

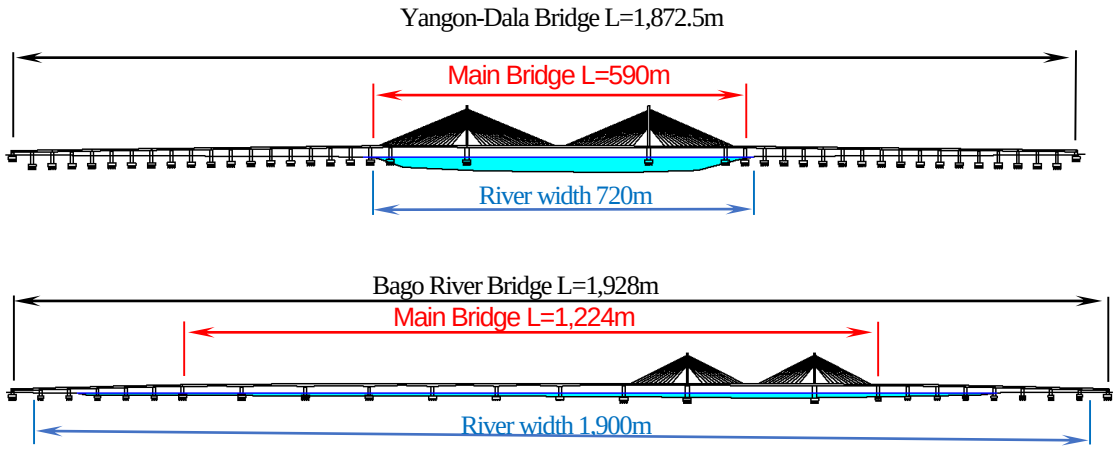
Table E-2 Bridge length and width of Yangon-Dala Bridge

Item	Description	Length (m)	Width (m)
Approach Bridge 1	19-span PC Beam	665	20.9
Main Bridge	3-span PC cable stayed	590	26.5
Approach Bridge 2	2-span steel box+16-span PC beam	540	14.3
Total of Main Bridge		1,872	-
Ramp A	3-span steel box+12-span PC beam	525	7.1
Ramp B	3-span steel box+11-span PC beam	490	7.1

Source: Feasibility Study for Korea-Myanmar Friendship Bridge Project

1.1.2 Conditions for comparison

Though Yangon-Dala Bridge and Bago River Bridge have similar bridge length shown in Figure E-3, two bridges have different proportions because of the difference in the widths of these rivers, 720m and 1,900m, respectively. The length of Main Bridge of Yangon-Dala Bridge is 590m, while that of Bago River Bridge is 1,224m.



Source: JICA Study Team

Figure E-3 Profiles of Bridges (Main Bridge)

1.1.3 Results of cost comparison

(1) Project cost comparison per river width

If the most important function of the river bridge is "crossing the river", it can be said that the index of "project cost per bridge width" makes sense, because the wider the river is, the more challenging the bridge construction is.

The comparison result of Yangon-Dala Bridge (across Yangon River) and Bago River Bridge (across Bago River) is shown in Table E-3.

Table E-3 Comparison of total project cost per river width

Bridge Name	Project cost (Eligible portion, USD)	River width (m)	Cost per bridge length (USD/m)	Rate
Yangon-Dala Bridge	137.8	720	0.19	1.36
Bago River Bridge	266,8	1900	0.14	1.00

Source: JICA Study Team

Even though the eligible portion of project cost of Bago River Bridge is as twice as that of Yangon-Dala Bridge, the cost per river width of Bago River Bridge is cheaper.

(2) Cost comparison by Construction cost per Bridge length

Focused on the main bridge, the result of the comparative study is shown in Table E-4.

Table E-4 Comparison of main span (on the river)

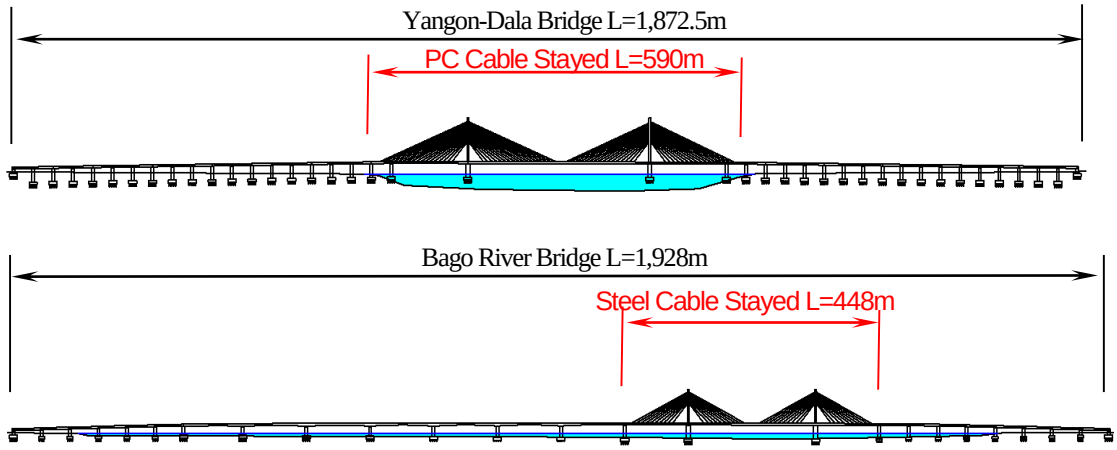
Bridge Name	Construction cost (USD)	Length (m)	Cost per bridge length (USD/m)	Rate
Yangon-Dala Bridge	65,757,524	590	111,453	1.08
Bago River Bridge	126,264,000	1,224	103,156	1.00

Source: JICA Study Team

Even though the construction cost of main bridge of Bago River Bridge is as twice as that of Yangon-Dala Bridge, the unit cost, the costs per bridge length, are similar and Bago River Bridge is slightly lower.

In a part of Main Bridge, there is Steel Cable Stayed Bridge in Bago Bridge as shown in Figure E-4.

On the other hand, the main bridge of Yangon-Dala Bridge is PC cable stayed bridge. The following table shows the comparison specifically between PC Cable Stayed Bridge in Yangon-Dala Bridge and Steel Cable Stayed Bridge in Bago River Bridge.



Source: JICA Study Team

Figure E-4 Profiles of Bridges (Superstructure Types)

Table E-5 Comparison of cable stayed bridge section

Bridge Name	Construction cost (USD)	Length (m)	Cost per bridge length (USD/m)	Rate
Yangon-Dala Bridge	65,757,524	590	111,453	0.78
Bago River Bridge	63,825,000	448	142,467	1.00

Source: JICA Study Team

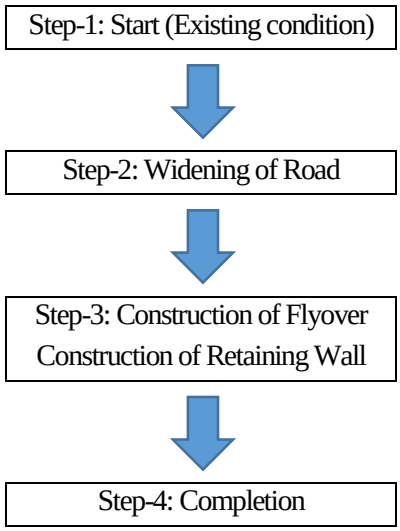
It is found that the unit cost (cost-per-bridge area value of the span of Steel Cable-stayed Bridge in Bago River Bridge (224m) is relatively higher than that of PC Cable-stayed Bridge in Yangon-Dala Bridge. One of the major reasons for the difference in unit cost is that the main span length of Bago River Bridge is controlled by that of Thanlyin Bridge and the resultant span length is not in the range of economical span.

Mentioned about the other portion, in other words on-land portion, they also are in different situations for bridge design. At the location of Yangon-Dala Bridge, Yangon River and the land are distinctively separated by the revetment. Therefore, the approach bridges are designed with no consideration of effective river flow but economic spanning.

On the other hand, at the location of Bago River Bridge, there is no definitive revetment but very narrow slope and natural dump area on the both sides of the river where the large flood water or storm surge comes at intervals. So the spans of the approach bridge are planned 50m to secure the smooth river flow.

Appendix F Construction Plan of Flyover on Yangon Side

The Flyover on Yangon side was constructed as following steps.



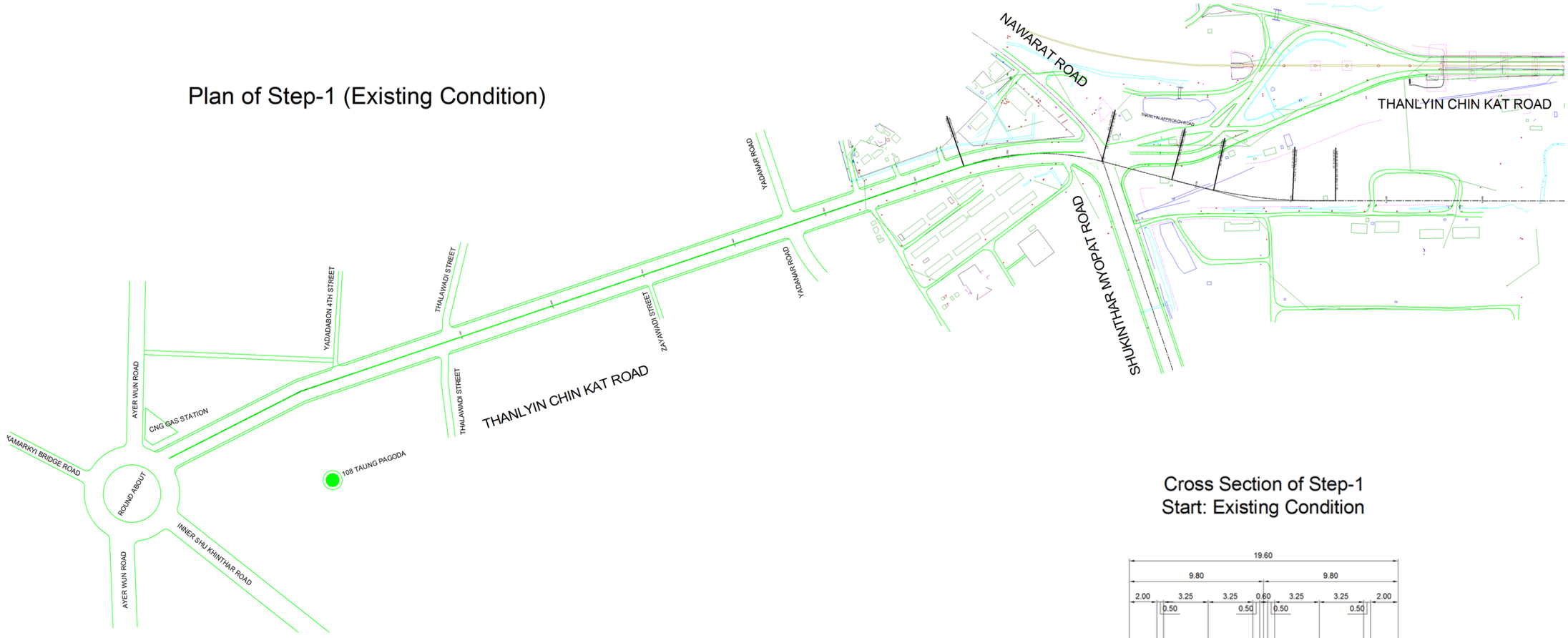
Source: JICA Study Team

The conditions of construction plan were set as below.

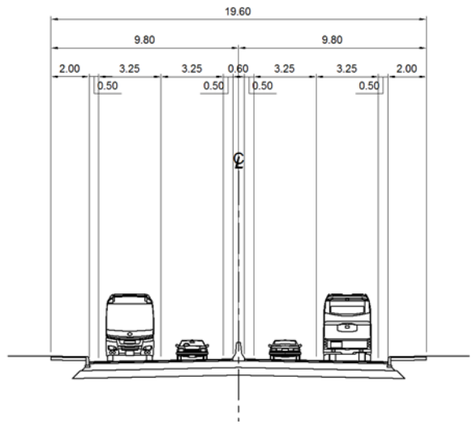
- Minimum width of carriage way is adopted 3.0m in consideration of the maximum width of design vehicle (trailer: 2.6m) mentioned in AASHTO and lateral margin.
- Width between carriage way and construction area is kept over 1.0m. It is assumed 0.5m for shoulder and 0.5m for space of temporary safety measure (fence and etc.).
- Width of sidewalk is adopted 2.0m in accordance with minimum width mentioned in Japanese Road Design Standars.

The drawings of construction steps are shown in the figures bolow.

Plan of Step-1 (Existing Condition)

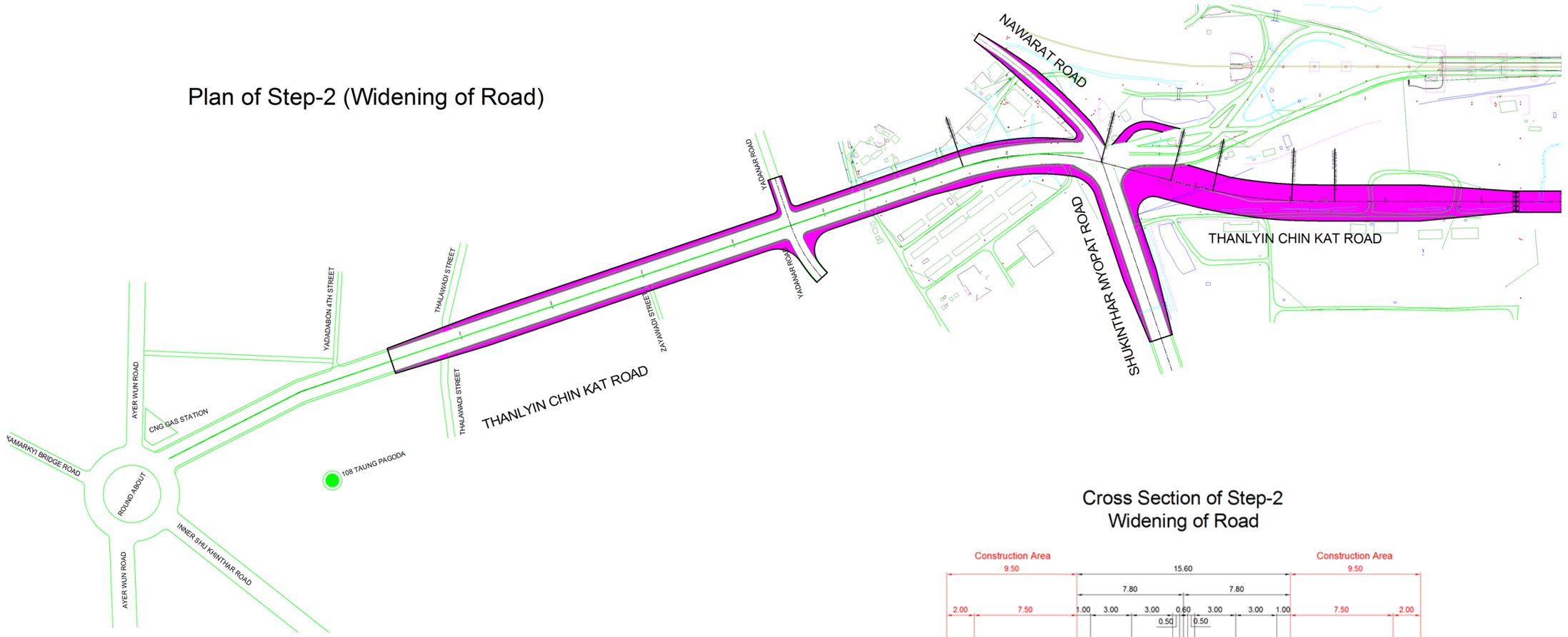


Cross Section of Step-1
Start: Existing Condition

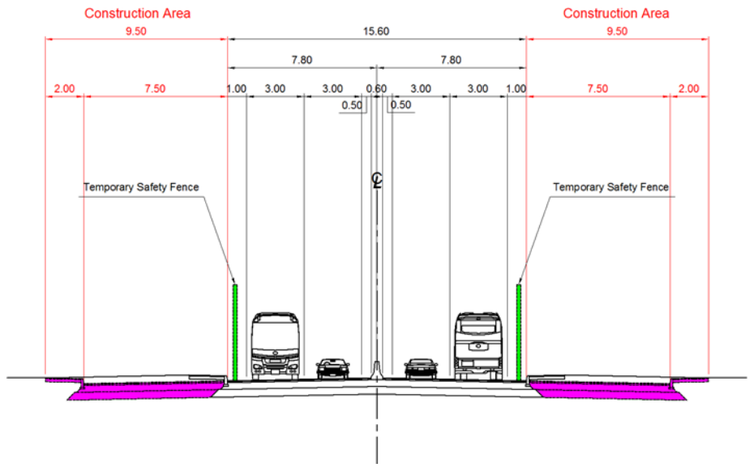


Source: JICA Study Team

Plan of Step-2 (Widening of Road)

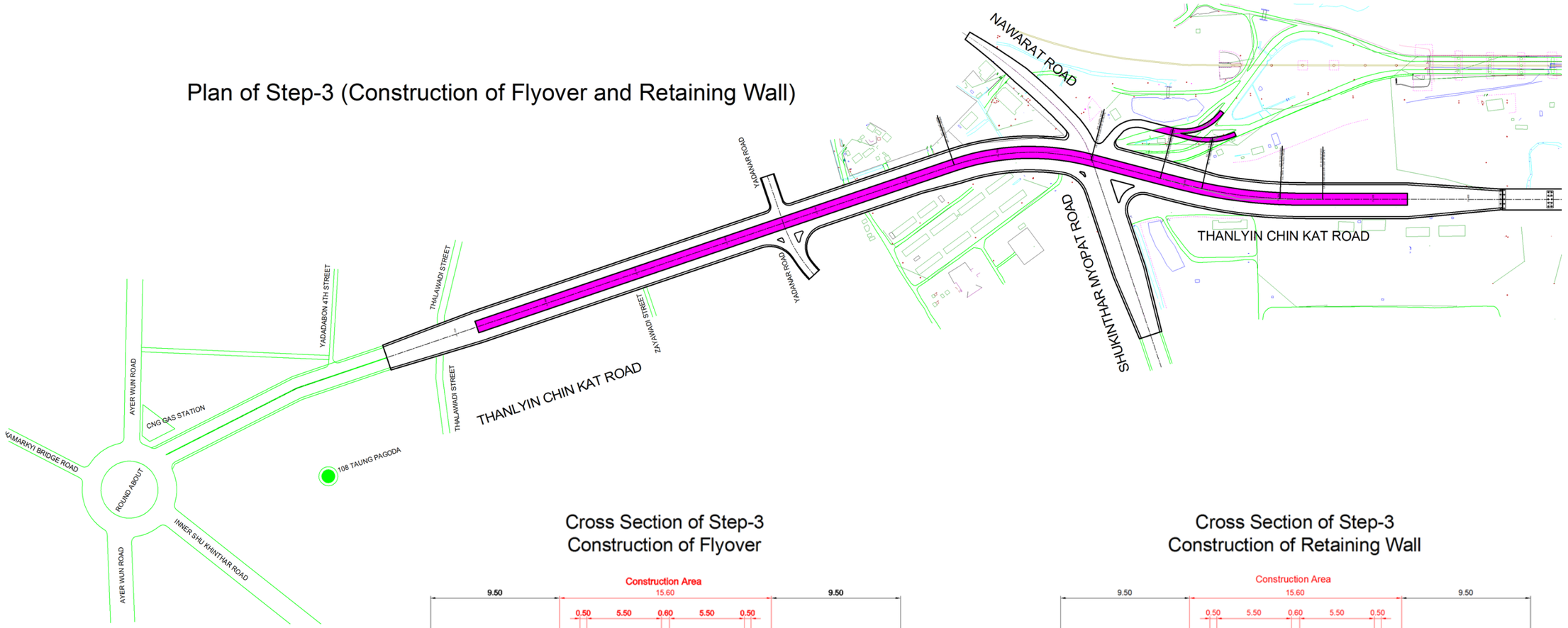


Cross Section of Step-2 Widening of Road

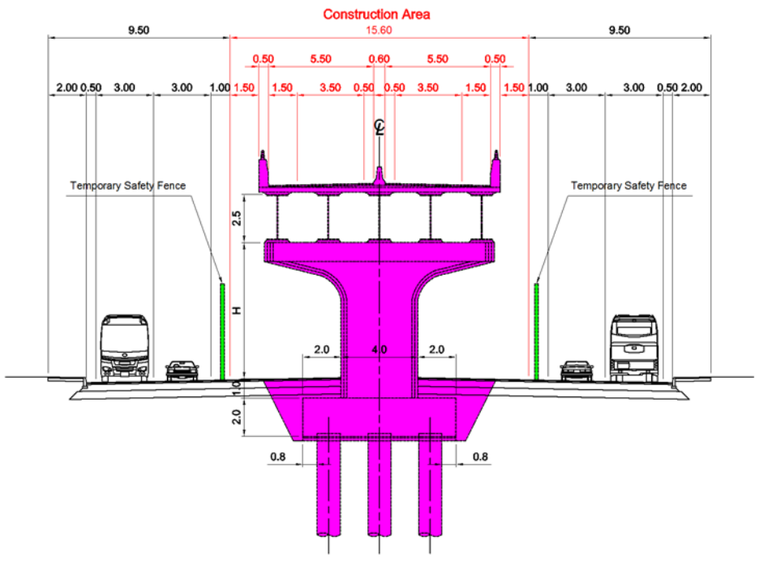


Source: JICA Study Team

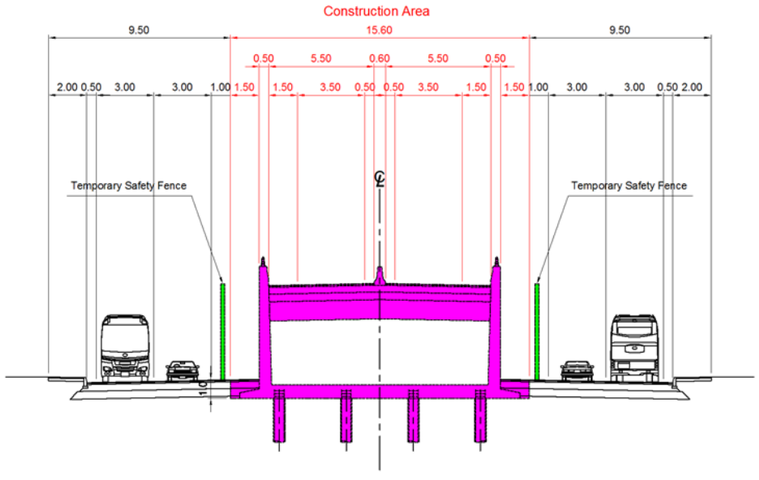
Plan of Step-3 (Construction of Flyover and Retaining Wall)



Cross Section of Step-3 Construction of Flyover

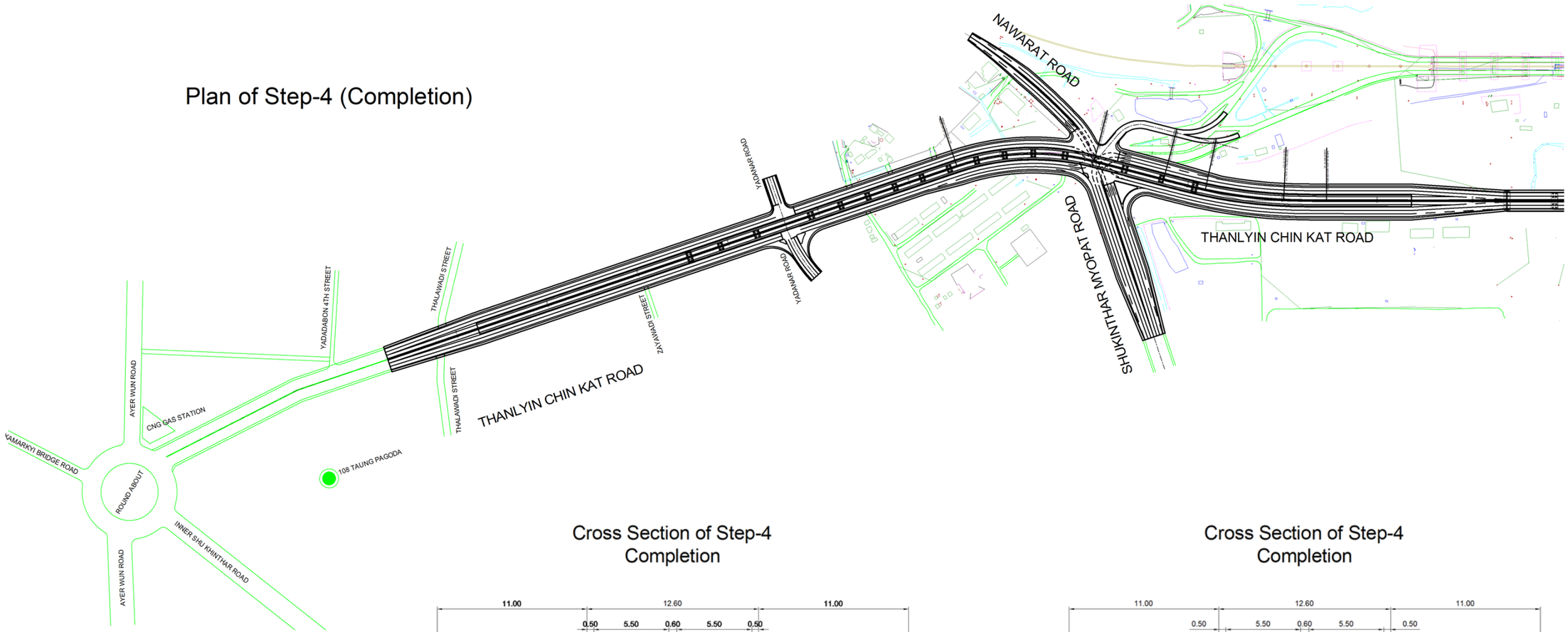


Cross Section of Step-3 Construction of Retaining Wall

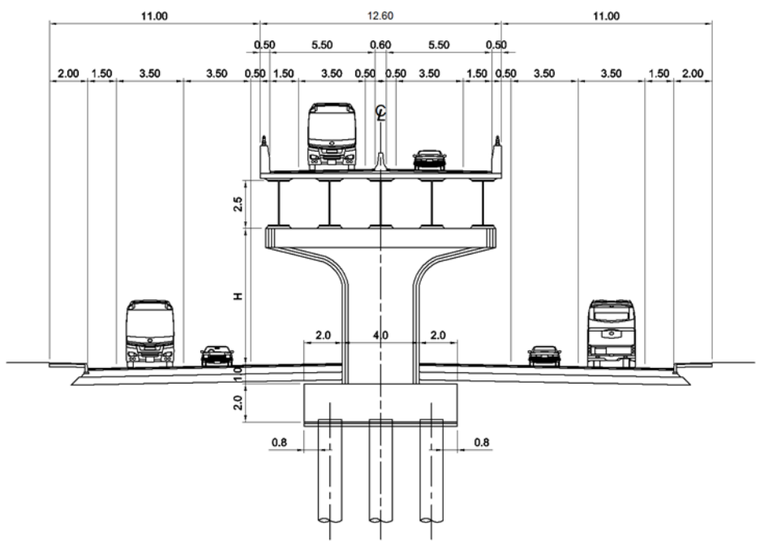


Source: JICA Study Team

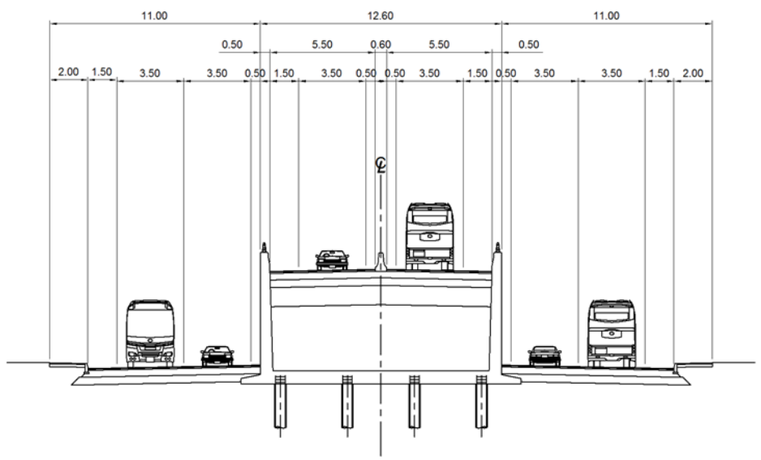
Plan of Step-4 (Completion)



Cross Section of Step-4 Completion



Cross Section of Step-4 Completion



Source: JICA Study Team

Appendix G Area for Construction Yards

(1) Introduction

In this chapter, necessary areas for construction yards are estimated and compare with the available vacant land for clarify whether temporary land acquisition will be necessary or not.

(2) Estimated Areas of Construction Yards

The following table shows the preliminary estimation of necessary areas of construction yards for the bridge and flyover construction.

Table G.1 Preliminary Estimation of Necessary Areas of Construction Yards

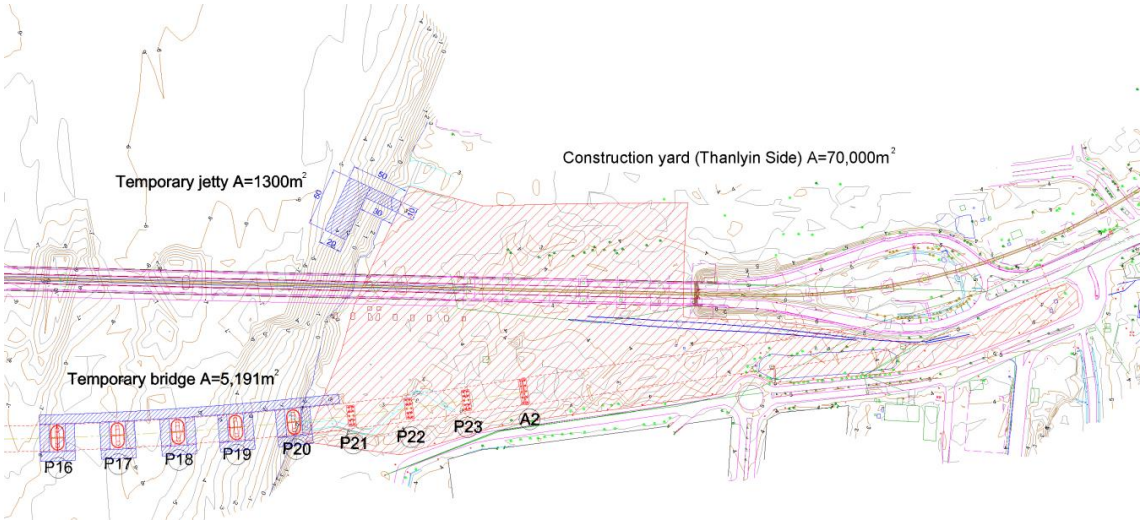
Item	Bridge Section		Flyover Section
	Taketa Side	Thanlyin Side	
Concrete & Asphalt Plant	8,000	8,000	3,000
Precast Segment	9,000	12,000	
Stockyard for Reinforcement Bar, Form Work	13,000	15,000	5,000
Material & Equipment	30,000*	30,000*	8,000
Office, Dormitory, Car Parking, Shed	3,000	3,000	2,000
Total Area (m^2)	63,000	68,000	18,000

Note*: ROW can be utilized.

Source: Study Team

(3) Construction Yard on Thanlyin Side

As stated in FS Report of 2014, Construction Yard on Thanlyin Side is expected to be located in the Compound of Myanmar Railway which is large enough as shown in the following figure.



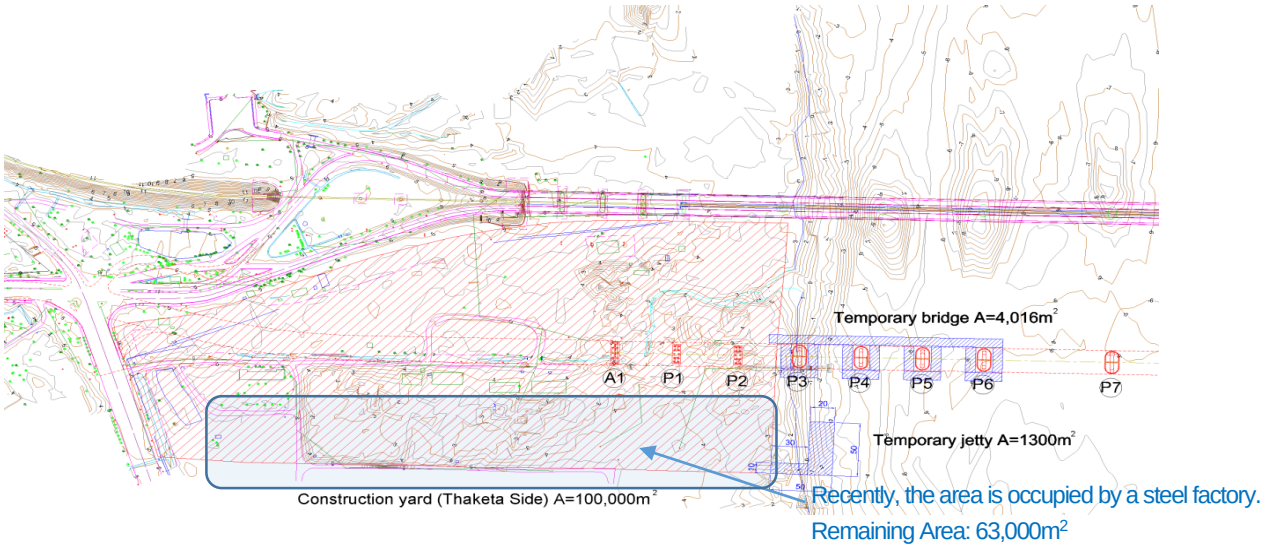
Source: F/S Final Report

Figure G.1 Available Land for Construction Yard on Thanlyin Side

(4) Construction Yard on Thaketa Side

On Thaketa side, Construction yards is expected to be located in the compound of MOC and Myanmar Railway.

However, the compound of MOC is now occupied by a factory and remaining available area is estimated as 63,000m^2, which is equal to estimated necessary area for construction yard. Further occupation may need additional land acquisition.



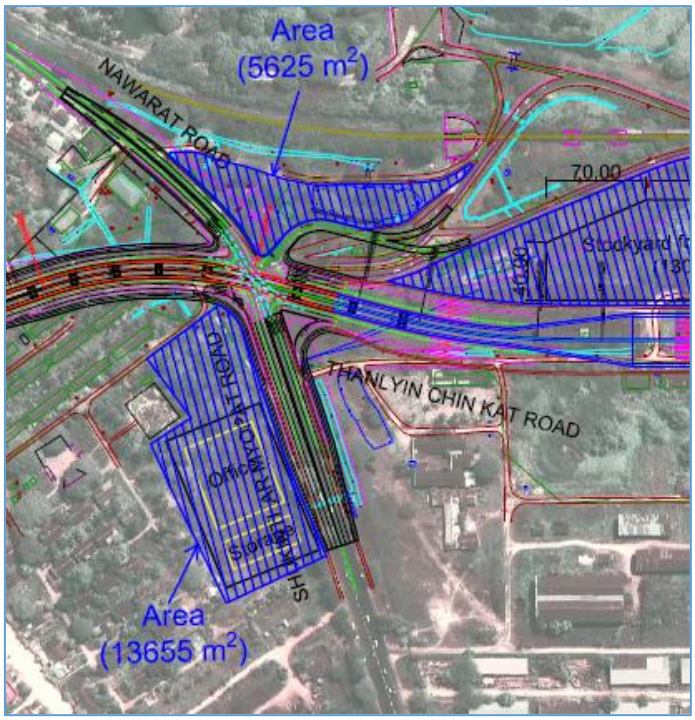
Source: F/S Final Report, added by Study Team

Figure G.2 Available Land for Constructtion Yard on Thaketa Side

(5) Construction Yard for Flyover

For Flyover, possible construction yard is as shown in the slide.

It is considered that the area of 19,280m^2 (=5,625m^2＋13,655m^2, Myanmar Railway Compound) is available, which is more than the estimated necessary area for construction yard.



Source: Study Team

Figure G.3 Area available for Yard of Flyover Construction.

Appendix H Study of Toll Gate for Bago Bridge

The Toll Gate for Bago Bridge was studied based on the Design Standard of NEXCO (Nippon Expressway Company).

(1) Number of Toll Booth

The number of toll booth was calculated by using following formula in accordance with the Design Standard of NEXCO.

$$U = \frac{B \times DHV}{3600 \times S} < 1.0$$

Where:

U: Unit Strength of Traffic per 1 lane (veh)

B: Time of Service (sec); Generally, the time of service is 8 second.

DHV: Design Hourly Volume (veh/hr)

S: Number of Toll Booth (nos)

The results of caluculation for number of toll booth is shown in the table below.

Table H.1 Calculation of Necessary Number of Toll Booths

Direction	DHV		B	S	U	Remarks
	(pcu/hr)	(veh/hr)	(sec)	(nos)	(veh)	
Flyover to Bago Bridge	950	798	8	3	0.591	
Bago Bridge to Flyover	1,160	974		3	0.721	
Bago Bridge to Shukhinthar Intersection	1,480	1,243		3	0.921	
Shukhinthar Intersection to Bago Bridge	1,180	991		3	0.734	

Source: JICA Study Team

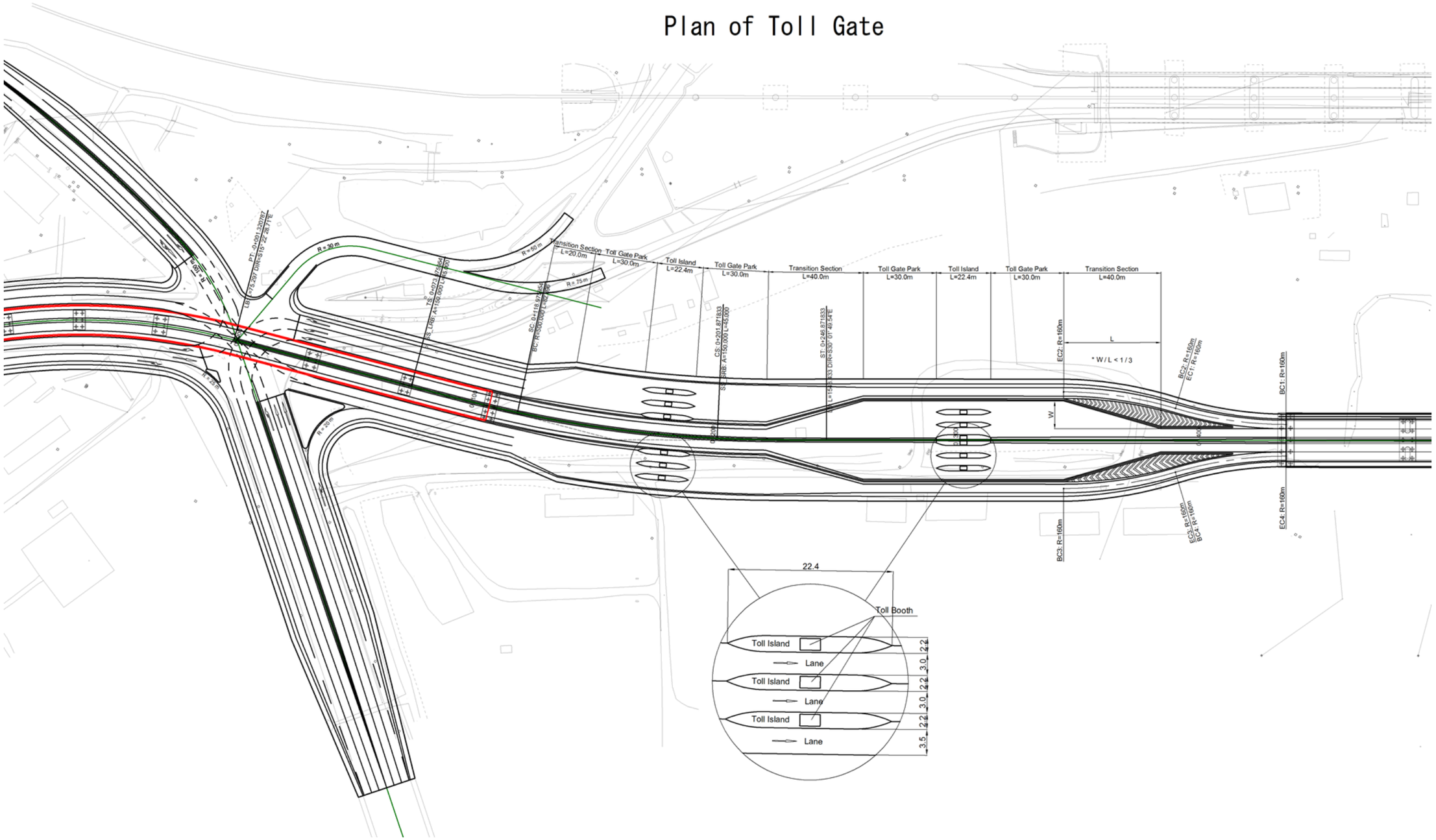
As a result, the number of toll booth is adopted 3 numbers per lane.

(2) Layout of Toll Gate

The layout of toll gate was planned as following conditions in accordance with the Design Standard of NEXCO.

- Ratio of lateral transition (W / L) was adopted 1 / 3 and over (W: width of lateral transition, L: length of transition section).
- Length of toll gate park was adopted 30m.
- Length of toll island was adopted 22.4m and width of it was adopted 2.2m.
- Width of lane at toll gate was adopted 3.0m. However, width of most right lane was adopted 3.5m in consideration of large vehicle passing.

The plan of toll gate is shown in the figure below.



Source: JICA Study Team

Figure H.1 Plan of Toll Gates and Layout of Toll Booths