

CHAPTER 8. CONCLUSIONS AND RECOMMENDATIONS

8.1 CONCLUSIONS

This section reviews the project summary in the light of this Supplemental Study and items/issues are included. Updates have been made in accordance with the results of discussions between JICA and MOC held on 25 March and 27 May 2016.

(1) Summary of Facilities of Road and Bridge

As a result of this supplemental survey on the facilities of the road and the bridge including improvement of the adjacent intersections and connecting roads are summarized as follows:

a) Right bank of Bago River

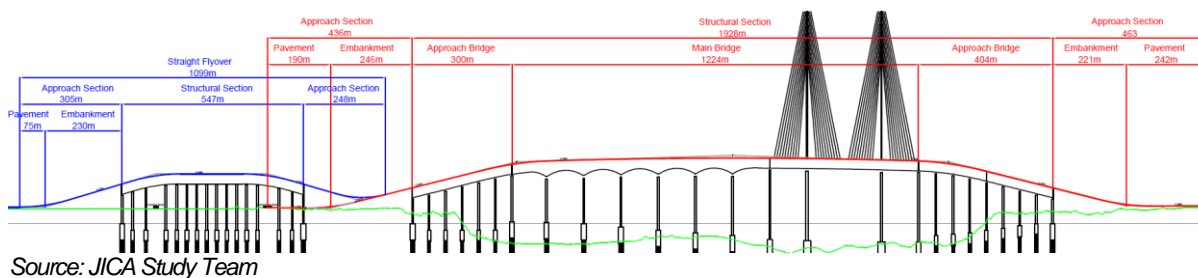
Jurisdiction	Thaketa Township (YCDC)
Road linked to the Project	Shukhinthar-Mayopat Road and Thanlyin Chin Kat Road
Length of approach road	436 m (overlapping with Flyover Section: 353m)
Length of Flyover Section	1099 m
	North Approach Section 248m (retaining wall section 248m)
	Structural Section: 547 m
	South Approach Section: 304 m (retaining wall section: 230m)

b) Bridge - Total length 1,928 m

Superstructure:	Main Bridge: 1,224 m,
	- Steel Continuous Box Girder Bridge with Steel Deck Plate: 776m
	- Steel Cable-stayed Bridge: 448m
	Approach Bridges: 704 m
	- PC Precast Box Girder Bridge :300m,
	- PC Precast Box Girder Bridge: 404m
Substructure:	Piers and Abutment: Reinforced Concrete
Foundation:	In the river: Steel Pipe Sheet Pile Foundation
	On land: Cast-in-situ Concrete Pile

c) Left bank of Bago River

Jurisdiction	Thanlyin Township (YRDC)
Road linked to the Project	Kyaik Khauk Pagoda Road
Length of approach road	463 m (retaining wall section 221m)
Length of On-ramp	579 m
	Approach Section: 391 m (retaining wall section: 89m)
	Flyover Section: 188m



Source: JICA Study Team

Figure 8-1 Profile of the Project

(2) Social Consideration Issues

The A-RAP report was also updated considering the additional scope of works, in particular, Flyover Section in Thaketa Township, where PAHs of 33 are counted that they need resettlement and relocation and PAPs of 58 are noted that they need some kinds of assistance or compensation but relocation is not necessary for them in this supplemental survey. The number of PAPs in total for the whole project is 190 ((33 PAHs× 4)+ 58 PAPs by assuming that there are four members in each household).

There is no social impact in Thanlyin Township where on-ramp is proposed to construct to connect to Bago River Bridge from residential area.

In order to facilitate land acquisition and mitigate impacts caused by the Project to the local communities, the following tasks are recommended to be carried out during the detailed stage.

- 1) Establish a compensation committee including MOC, MR, YCDC, DUHD in MOC, Township administrator of GAD and related ward administrators of GAD.
- 2) Conduct DMS and an inventory survey in the pre-construction phase by a compensation committee to clarify exact land acquisition area, who owns those land and what are PAFs.
- 3) Conduct socio-economic survey in the pre-construction phase by a compensation committee to grasp the socio-economic features of PAPs for policy-making and for preparing baseline data for A-RAP monitoring.
- 4) Update policies on compensation, resettlement, and entitlement for PAPs based on the latest guidelines/regulations, the results of the socio-economic survey and the decision of a compensation committee.
- 5) Prepare concrete plans to relocate affected houses, utilities, etc. and to construct resettlement sites for PAPs.
- 6) Prepare an income/livelihood restoration plan for PAPs.
- 7) Identify institutional organization for A-RAP implementation.
- 8) Work out a schedule for resettlement-related activities.
- 9) Prepare a plan for information dissemination and public consultation (including the preparation of a leaflet to introduce the Project)
- 10) Revise A-RAP monitoring plan to guide activities related to A-RAP monitoring and supervision.
- 11) Revise cost estimation for land acquisition, compensation, resettlement, livelihood restoration, social monitoring and supervision.
- 12) Prepare an HIV/AIDS prevention plan during the early stages of detailed design.
- 13) Entrust a consultant or NGO with the implementation of the HIV/AIDS prevention plan during pre-construction phase and construction phase.

(3) Environmental Consideration Issues

IEE report was also updated considering the additional scope of works, in particular, Flyover Section in Thaketa Township and On-ramp Section in Thanlyin Township.

In order to mitigate impacts on the natural environment of the localities, it is suggested to implement the following tasks during the detailed design stage:

- 1) Conduct environmental survey on air quality, noise, surface water quality, and ecosystems in and around the project area to collect baseline data during pre-construction phase.
- 2) Work together with members of the technical design teams to examine and work out concrete measures for mitigating impacts to ambient air, acoustic environment, surface water bodies, ecosystems, etc... during Detailed Design.
- 3) Prepare detailed Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) during pre-construction phase.
- 4) An officer of DOB who attended JICA training on Environmental and Social consideration process of Japanese ODA loan will give training to an Environmental and Social staff in PMU of MOC during pre-construction phase if they did not attend this training.
- 5) An Environmental and Social staff in PMU of MOC will conduct environmental supervision and monitoring to reduce environmental pollution during construction phase.

8.2 RECOMMENDATIONS

The recommendations in this study are summarized as follows:

(1) Coordination with YCDC

YCDC has plan for widening of Thanlyin Chin Kat Rd to 6 lanes. Since Straight Flyover is along to the road, the construction plan need to be in accordance with the plans of road widening.

(2) BRT

Since Thanlyin Bridge and Thanlyin Chin Kat Road is planned as a BRT route in YUTRA, the improvement plan of the roads need to be in accordance with BRT plan.

(3) Thaketa Roundabout

The traffic volume at the roundabout will be beyond its capacity and it is recommended to improve the capacity of the roundabout. Since YCDC does not have any plan to improve Thaketa Roundabout, common understanding with Thanlyin Township is important. It would be appreciated, if MOC could decide about the improvement after discussion with YCDC.

(4) Steady and Progressive Implementation of Environmental and Social Considerations

The environmental and social requirements to realize a Japanese ODA loan for the Project will be clarified when the RAP is approved. For the successful implementation of the Project, the tasks for the environmental and social consideration must be progressively undertaken by DOB during the entire Project period.

(5) Construction Safety

Since the Flyover Portion is located in an urban area, safety measures should be taken.

The main bridge is located offshore and cyclone attacks the region almost every year. Very strong winds and high waves could damage the construction site, facilities and equipment. Special attention should be taken for the protection of the construction site from cyclones and heavy rains.

(6) Operation and Maintenance (O&M)

The road and bridge of the Project is like an “Industrial Road” with busy freight transport between the industrial core in the northern economic focal regions and Thilawa. There will be huge traffic of heavy trucks.

Pavement surface conditions are very much effect to the transport speed, and as a result, it adversely affects the growth of the national economy. O&M quality should be seriously studied, and institutional and organizational preparation should be timely established.

In addition, the road is hit by cyclones and heavy seasonal rains almost every year. Operation of the bridge should closely cooperate with the meteorological center of the region.

(7) Risks of Delay and Countermeasures

Since there are several “Delay Risks”, progress of the works and related activities should be officially monitored and appropriate countermeasure should be taken to avoid or reduce further delay.

Anticipated measures for risks on delay are summarized in Table 8-1.

Table 8-1 Anticipated Measures for Risks of Delay



No.	Kind of Risk on Delay	Potential Risks	Anticipated Measures
1	Design Works	<ul style="list-style-type: none"> • Delay of works. • Delay of approval by the client. • Lack of communications between the client and the consultant. 	<ul style="list-style-type: none"> • Select competent consultant. • Coordinate well with relevant stakeholders.
2	Land Acquisition	<ul style="list-style-type: none"> • Delay of preparation of land acquisition documents. • Delay of land acquisition by local authorities. 	<ul style="list-style-type: none"> • Monitor the progress of the land acquisition issue and review the progress periodically.
3	Procurements	<ul style="list-style-type: none"> • Delay of preparation of tender documents. • Delay of approval of tender documents. • Delay of tender evaluation. • Delay of approval of tender evaluation. • Delay of contract negotiation. • Delay of approval of the contract. 	<ul style="list-style-type: none"> • Timely procure the supervision consultant. • Timely procure the contractors.
4	Construction Works	<ul style="list-style-type: none"> • Unfamiliar with the local culture and custom. • Not mobilizing the proper equipment, key personnel, and materials on site. • Unfamiliar with technical method. • Unfamiliar with FIDIC conditions of contract. • Unforeseeable natural disaster, i.e. typhoon. • Delay of possession of site. • Delay of clarification of the work demarcation • Lack or delay of work coordination with neighboring works. 	<ul style="list-style-type: none"> • Select competent contractor(s). • Monitor and control the construction progress strictly.
5	Environmental Impacts Mitigation Actions	<ul style="list-style-type: none"> • Unfamiliar with environmental issues. • Lack of regular monitoring. 	<ul style="list-style-type: none"> • Prepare good and suitable Environmental Management Plan (EMP) in detailed design phase. • Monitor and control the contractor's EMP execution strictly. • Review monthly contractor's environmental monitoring report and give comments on it.
6	Road Widening of Thanlyin Chin Kat Rd.	<ul style="list-style-type: none"> • Delay of construction works. • Delay of work coordination between two projects. 	<ul style="list-style-type: none"> • Monitor the construction progress. • Prepare a contingency plan for delay of the road widening.
7	Establishment of O&M Organization	<ul style="list-style-type: none"> • Delay of preparation of O&M unit. • Delay of approval of O&M institutional arrangement for the project road. 	<ul style="list-style-type: none"> • Coordinate with DOB for selection of O&M organization. • Prepare good O&M plan.

Source: JICA Study Team

Appendix A Drawing

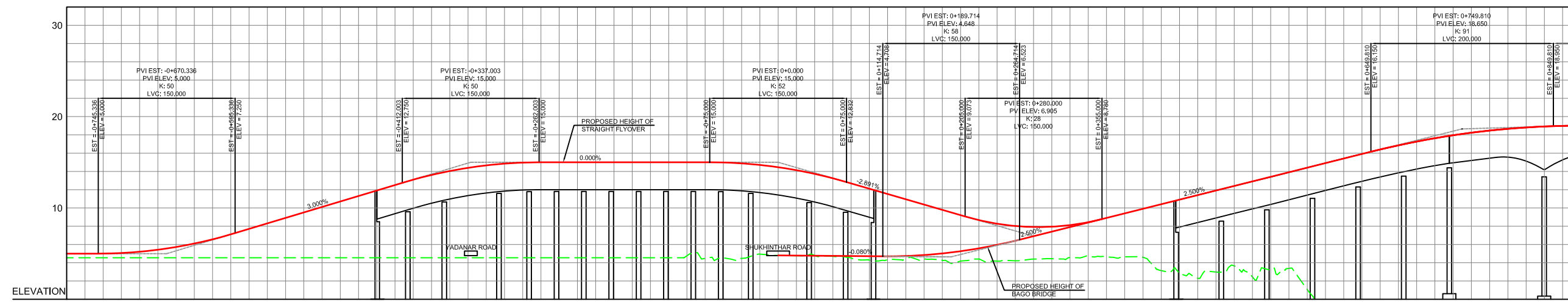
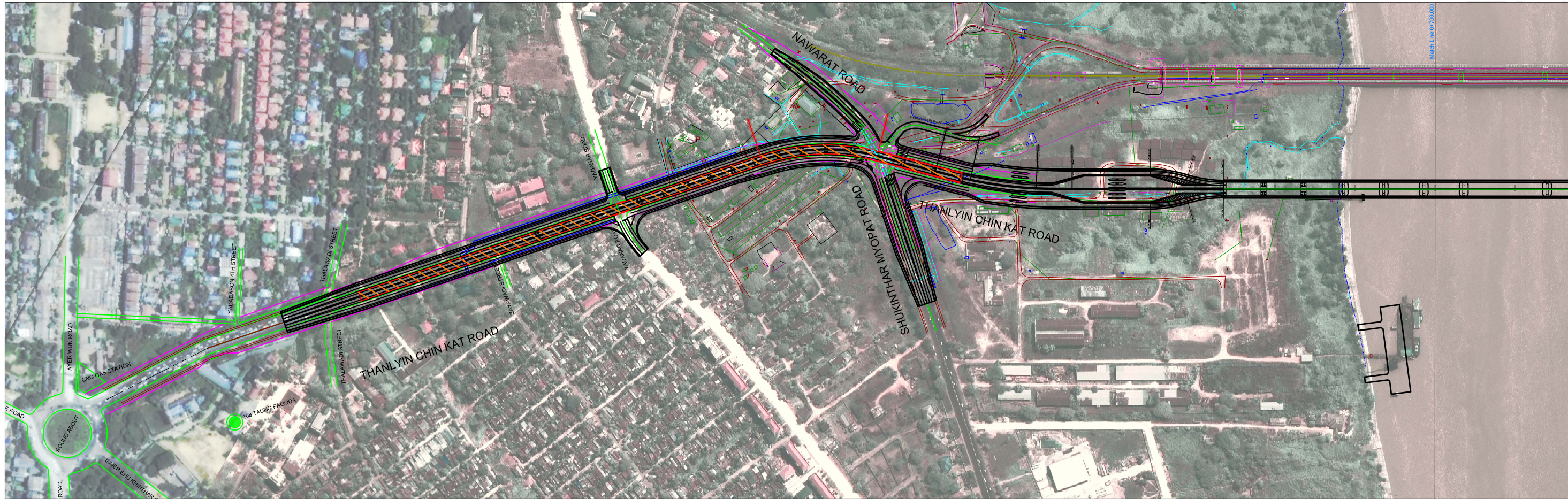
DRAWING LIST

SHEET NO.	TITLE	DRAWING NO.
1	DRAWING LIST (1/2)	GE-01
2	DRAWING LIST (2/2)	GE-02
3	PLAN AND PROFILE OF BAGO BRIDGE WITH STRAIGHT FLYOVER AT YANGON SIDE (1/3)	RD-01
4	PLAN AND PROFILE OF BAGO BRIDGE WITH STRAIGHT FLYOVER AT YANGON SIDE (2/3)	RD-02
5	PLAN AND PROFILE OF BAGO BRIDGE WITH STRAIGHT FLYOVER AT YANGON SIDE (3/3)	RD-03
6	PLAN AND PROFILE FOR ALTERNATIVE OF LEFT TURN FLYOVER AT YANGON SIDE	RD-04
7	PLAN AND PROFILE FOR ALTERNATIVE OF AT-GRADE IMPROVEMENT (WITHOUT FLYOVER) AT YANGON SIDE	RD-05
8	PLAN AND PROFILE OF ON-RAMP DIRECT TO BRIDGE AT THANLYIN SIDE	RD-06
9	PLAN FOR ALTERNATIVE OF ON-RAMP DIRECTLY FROM RESIDENTIAL AREA AT THANLYIN SIDE	RD-07
10	PROFILE FOR ALTERNATIVE OF ON-RAMP DIRECTLY FROM RESIDENTIAL AREA AT THANLYIN SIDE (1/2)	RD-08
11	PROFILE FOR ALTERNATIVE OF ON-RAMP DIRECTLY FROM RESIDENTIAL AREA AT THANLYIN SIDE (2/2)	RD-09
12	PLAN AND PROFILE FOR ALTERNATIVE OF STRAIGHT FLYOVER AT INTERSECTIONS ON THANLYIN SIDE	RD-10
13	TYPICAL CROSS SECTION OF APPROACH SECTION FOR BAGO BRIDGE	RD-11
14	TYPICAL CROSS SECTION OF APPROACH SECTION FOR STRAIGHT FLYOVER AT YANGON SIDE	RD-12
15	TYPICAL DETAILS OF PIER WITH STEEL GIRDER FOR STRAIGHT FLYOVER AT YANGON SIDE	RD-13
16	TYPICAL DETAILS OF PIER WITH PCT GIRDER FOR STRAIGHT FLYOVER AT YANGON SIDE	RD-14
17	TYPICAL DETAILS OF ABUTMENT (AF.1) WITH PCT GIRDER FOR STRAIGHT FLYOVER AT YANGON SIDE	RD-15
18	TYPICAL DETAILS OF ABUTMENT (AF.2) WITH PCT GIRDER FOR STRAIGHT FLYOVER AT YANGON SIDE	RD-16
19	TYPICAL CROSS SECTION OF APPROACH SECTION FOR ALTERNATIVE OF LEFT TURN FLYOVER AT YANGON SIDE	RD-17
20	TYPICAL CROSS SECTION OF APPROACH SECTION FOR ON-RAMP DIRECT TO BRIDGE AT THANLYIN SIDE	RD-18
21	TYPICAL DETAILS OF PIER WITH PCT GIRDER FOR ON-RAMP DIRECT TO BRIDGE AT THANLYIN SIDE	RD-19
22	TYPICAL DETAILS OF ABUTMENT (AO.1) WITH PCT GIRDER FOR ON-RAMP DIRECT TO BRIDGE AT THANLYIN SIDE	RD-20

 JAPAN INTERNATIONAL COOPERATION AGENCY	 NIPPON KOEI CO., LTD.	REMARKS	THE SUPPLEMENTAL SURVEY FOR THE PROJECT FOR CONSTRUCTION OF BAGO RIVER BRIDGE
 REPUBLIC OF THE UNION OF MYANMAR PUBLIC WORKS, MINISTRY OF CONSTRUCTION DEPARTMENT OF BRIDGES			DRAWING TITLE DRAWING LIST (1/2)
			SCALE -
			DRAWING NO. GE-01
			SHEET NO. 1

DRAWING LIST

SHEET NO.	TITLE	DRAWING NO.
23	TYPICAL DETAILS OF ABUTMENT (AO.2) WITH PCT GIRDER FOR ON-RAMP DIRECT TO BRIDGE AT THANLYIN SIDE	RD-21
24	TYPICAL CROSS SECTION OF APPROACH SECTION FOR ALTERNATIVE OF STRAIGHT FLYOVER AT INTERSECTIONS ON THANLYIN SIDE	RD-22
25	TYPICAL DETAILS OF PIER WITH PCT GIRDER FOR ALTERNATIVE OF STRAIGHT FLYOVER AT INTERSECTIONS ON THANLYIN SIDE	RD-23
26	TYPICAL DETAILS OF ABUTMENT (AS.1) WITH PCT GIRDER FOR ALTERNATIVE OF STRAIGHT FLYOVER AT INTERSECTIONS ON THANLYIN SIDE	RD-24
27	TYPICAL DETAILS OF ABUTMENT (AS.2) WITH PCT GIRDER FOR ALTERNATIVE OF STRAIGHT FLYOVER AT INTERSECTIONS ON THANLYIN SIDE	RD-25
28	GENERAL VIEW OF BAGO BRIDGE	BG-GP-01
29	GENERAL VIEW OF STRAIGHT FLYOVER AT YANGON SIDE (1/3)	BG-GP-02
30	GENERAL VIEW OF STRAIGHT FLYOVER AT YANGON SIDE (2/3)	BG-GP-03
31	GENERAL VIEW OF STRAIGHT FLYOVER AT YANGON SIDE (3/3)	BG-GP-04
32	GENERAL VIEW OF ON-RAMP DIRECT TO BRIDGE AT THANLYIN SIDE	BG-GP-05
33	PLAN AND PROFILE OF TOLL GATE	TL-01



GRADE OF STRAIGHT FLYOVER	i = 0.000%		i = 3.000%		i = 0.000%		i = -2.891%		i = 2.500%						
PROPOSED HEIGHT OF STRAIGHT FLYOVER	0.000%														
GRADE OF BAGO BRIDGE	i = -0.080%		i = 2.500%												
PROPOSED HEIGHT OF BAGO BRIDGE	0.000%														
EXISTING HEIGHT	0.000%														
STATION	0+000 to 0+880														
CURVE ELEMENTS	R=250.00 m, L=145.904 m, R=∞, L=75.297 m, A=150 m, L=45.000 m, R=500.00 m, L=62.90 m, A=150 m, L=45.000 m														